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Paper TRADE JOURNAL

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VOLUME 125, No. 1 JULY 3, 1947

WOOD PULP

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Established 1886

"Our Republic and its press will rise or fall together."

JOSEPH PULITZER

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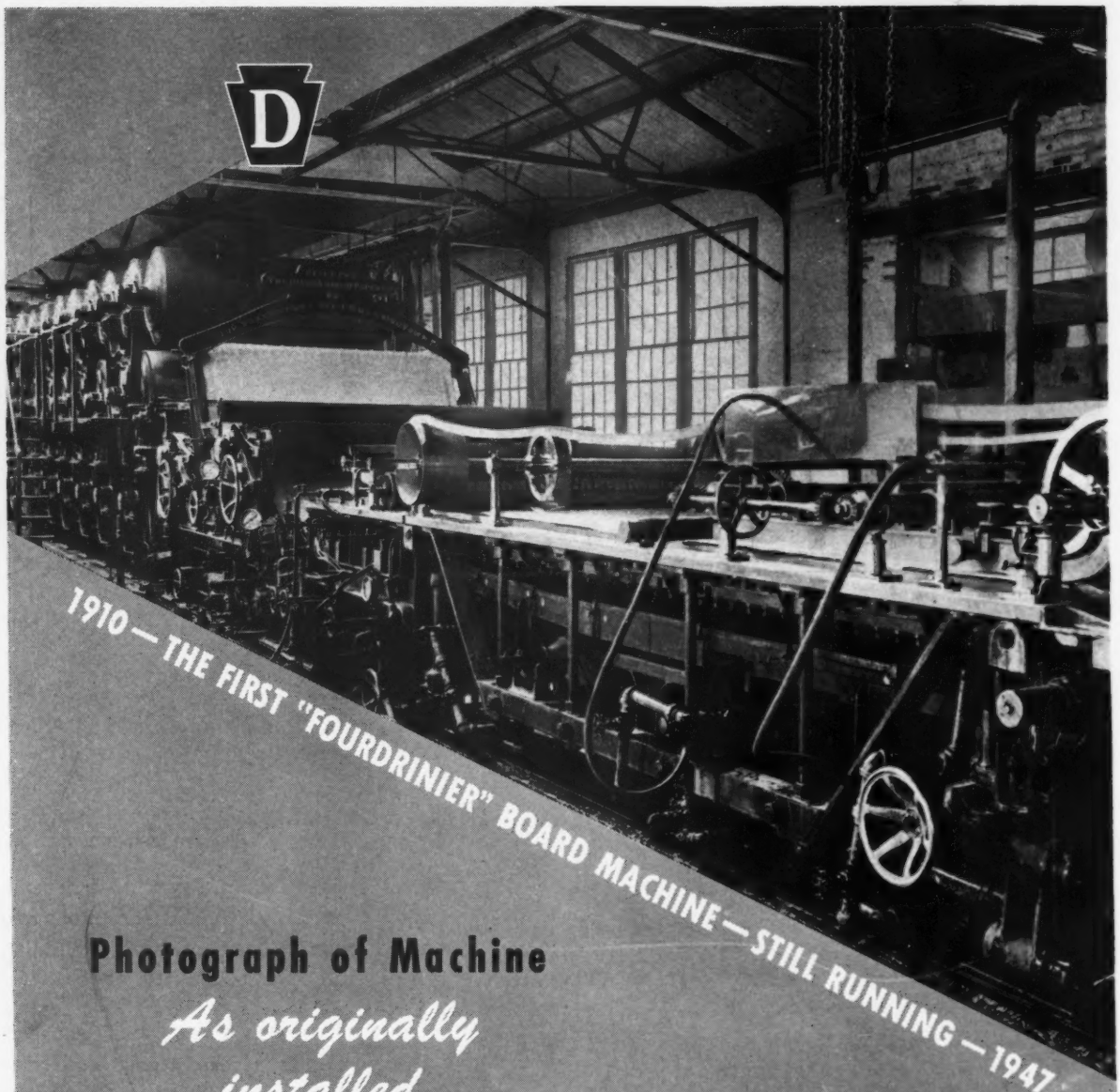
75th ANNIVERSARY



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SANDUSKY, OHIO

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DOWNINGTOWN

Designers & Builders
Paper Making Machinery

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CALENDAR OF COMING EVENTS

September 3-6, 1947—TAPPI Fundamental Research Meeting, Appleton, Wis.

September 24-27, 1947—TAPPI Acid Pulping Meeting, Minneapolis, Minn.

October 9-11, 1947—TAPPI Alkaline Pulping and Chemical Products Meeting, Asheville, N. C.

October 27-29, 1947—The National Paper Trade Association of the U. S., Inc., Semi-annual Convention, Hotel Sherman, Chicago.

November 3-5, 1947—TAPPI Second Engineering Conference, Philadelphia, Pa.

May 18-20, 1948—American Pulp and Paper Mill Superintendents Association, Annual Meeting, Roosevelt Hotel, New Orleans, La.

PAPER · · · America's 6th Industry

PAPER SACKS FOR OPEN STORAGE

(NEWS ITEM: *The nation's cement industry has used more than three billion multiwall paper bags since that type of packaging was first introduced.*)

Manufacturers of such perishable products as sugar, flour, powdered chemicals and cement have found the answer to many shipping problems with paper shipping sacks. Made of wet-strength paper, these multi-wall bags are custom-made to withstand the conditions under which each product is to be shipped and used. Fully meet such requirements as immersion for 24 hours and open storage without damage to contents by rain, snow, or steaming tropical humidity.

A 24-page book titled General Manual No. 1 describing Paper Shipping Sacks can be obtained by writing to Paper Shipping Sack Manufacturers Association, 370 Lexington Avenue, New York 17.

Paper Diapers . . . paper drapes . . . paper wash cloths . . . paper screw caps . . . new uses for paper calling for new standards of lightness and toughness, new standards of quality in performance. New responsibilities—new opportunities for the Pulp and Paper Industry.

The Puseyjones Organization is now devoting itself completely to the design and construction of Paper-Making Machinery built to new high standards of speed and efficiency, and to the modernization of existing machines.

Among the new machines under construction by Puseyjones are three of the largest and fastest Fourdrinier Machines, one for white paper for bags, one for Kraft liner board, and one for Kraft paper for multi-wall bags; also one Cylinder machine of record size and speed for the manufacture of floor covering felt. Other machines are under construction for the manufacture of M. G. Kraft specialties, facial tissues, and high grade bristols.

Puseyjones Engineers will welcome the opportunity to work with you in solving production problems.

THE PUSEY AND JONES CORPORATION
Established 1848. Builders of Paper-Making Machinery
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Paper TRADE JOURNAL
REG. U. S. PAT. OFF.
VOL. 125, NO. 1 JULY 3, 1947

Williamson Finds Demand High in West

SPRINGFIELD, Mass. — A combined business and pleasure trip to the Pacific Coast and through the Northwest and Canada, in which lumber camps and pulp mills were visited and their processes observed, was concluded last week by George Williamson, president of the Strathmore Paper Company.

The demand for paper on the Pacific Coast, Williamson remarked, "is tremendous." The population increase in that section of the country, he said, grew during the war and apparently the former war workers aren't returning to their native localities. "There is a great deal of new business out there," as a result, he said.

Manpower to staff the lumber and saw mills is sufficient, it was observed, since the former shipyard and other war plant workers have been taken on by the wood pulp industry. Despite excellent working conditions lumber camps are understaffed. Williamson said that the work as a lumberjack is not unattractive, though heavy and requiring a certain amount of skill.

On the other hand, he added, the camps were "well built and well maintained," and the workers were near enough to the cities so that they could live in their own homes, commuting to and from work, or at least could visit their families on week-ends.

An official of the Eastern States Exposition, Williamson said that he enjoyed a visit to the Toronto Exposition on his return trip.

Glatfelter Entertains Pulpwood Producers

Pulpwood producers and their families numbering 450 attended the annual picnic of the P. H. Glatfelter Company at Glatco Lodge near Spring Grove, Pa., on June 17th. A unique program was planned featuring, among other things, an exhibition of woodsmanship by Peter McLarin, former world champion wood chopper. There was also an exhibition of mechanized equipment used in the woods.

Contests in felling trees and peeling pulpwood together with contests for the women and children preceded the luncheon, after which visitors were taken on a tour of the nearby Glatfelter pulp and paper mill.

Among those in attendance were representatives of the Pennsylvania Department of Forests and Waters, Pennsylvania State College School of Forestry, the University of Maryland, the U. S. Forestry Service, the U. S. Soil Conservation Service, the American Forest Products Industries, Inc., and the Southern Pulpwood Conservation Association.

Western SAPEYES Hear Meek At Sherman

CHICAGO—J. T. Meek, executive secretary of the Illinois Federation of Retail Associations, spoke at the Monday noon, June 30, meeting of the western division of the Salesmens Association of the Paper Industry at the Hotel Sherman. Mr. Meek, who had previously spoken for the western division, spends a great deal of his time in the Illinois State Capitol and at Washington and reviewed the economic effects of recent legislative developments and discussed the current position of its 40,000 members as far as the business picture is concerned.

KVP Elects Wood Manufacturing V.-P.

KALAMAZOO, Mich.—John C. Wood has been named vice-president in charge of manufacturing by the Kalamazoo Vegetable Parchment Company. He has also been elected to the board of directors. Mr. Wood first came with KVP in 1924, working on a waxing machine. He was transferred to maintenance costs, then to production costs. Prior to his new appointment, he was in charge of converting operations.

JOHN C. WOOD
Heads KVP Manufacturing

Kimberly-Clark Plans $45,700,000 Expansion

NEENAH, Wis. — Kimberly-Clark Corporation, manufacturers of pulp, paper and allied products, on Friday, June 27, registered 300,000 shares of common stock with the Securities and Exchange Commission in Philadelphia, and simultaneously revealed here that its expansion program, now in varied stages of completion, will total $45,700,000 in new productive facilities. This is believed to be the largest in the industry.

Kimberly-Clark owns and operates eight mills in the United States, in addition to subsidiary and affiliated operations in this country and in Canada. There are 1,199,520 shares of common stock outstanding.

In Philadelphia, it was reported that Blyth and Co., Inc., New York, heads the underwriting group, and that part of the money for the corporation's expansion program will be raised through sale of $12,500,000 bonds to be issued by Longlac Pulp & Paper Co., Terrace Bay, Ontario, a Canadian subsidiary, and sale of $7,500,000 notes.

Major projects in the current expansion program are two new mills and two major additions. The mills are at Memphis, Tenn., and the Longlac mill, and the additions are to mills at Neenah and Niagara, Wis.

The Memphis plant, now in partial operation, will begin production in the first half of next year to become the largest creped wadding producer in the South. The new chemical pulp mill at Terrace Bay is expected to begin production in 1949.

The newest of Kimberly-Clark's creped wadding machines began operation last month in the addition to the mill at Neenah, and at Niagara the corporation's largest increase in book paper capacity undertaken since 1920 rapidly is nearing completion.

New production made possible by the new mills and additions will approximate 700 tons daily in pulp, paper and creped wadding. Aside from new production facilities, modernization of existing mills has been in progress since 1945.

The corporation reported net income of $3,157,229 for the first five months of this year, $1,107,516 short of its aggregate net income for all of last year.

The summary of net income shows the company's profits for all the years between 1937 through 1945 were less than the amount reported for the first five months of this year.

Canada Makes Machine Coated Book Papers

TORONTO — Machine coated book papers are being made in Canada for the first time, at the Port Arthur plant of Provincial Paper Company, according to President D. W. Ambridge.

For the first time coatings are applied on the paper machines to both sides of the sheet as a continuous and integrated part of the manufacture. Hitherto, coatings have been applied as separate operations, frequently in different plants, as substantially higher costs.

The process permits the sale of first-class coated papers for publishing and commercial purposes at very close to the price of uncoated super-calender papers. This should result in substantially wider use of the better type paper by many Canadian publishing firms.

The cost of the installation of the special equipment necessary to turn out this class of paper by this integrated process is said to have been close to $600,000.

Ultimate annual productive capacity to be reached early in 1948, when installations are completed of all auxiliary finishing equipment, is estimated at 27,000 tons. This will provide a surplus for export over estimated domestic needs. It will be 60 to 90 days before this paper can be made generally available throughout Canada.

Provincial Paper is the Canadian patent licensee of the Consolidated Water Power & Paper Co. process in the United States.

Chicago News At $18 Other Waste Steady

CHICAGO — The waste paper market, locally a pretty important barometer and a mighty important adjunct to production, was reported nominally steady in this area this week. There were some disquieting reports that paper was becoming harder to move because of mill preparations for summer closings. Some reports state that mills are not taking in any material at this time and this was reflected in the fact that while No. 1 news, for example, was quoted at $20 a ton, delivered to the mills, there were reports of so-called "distress" sales as low as $18. Chicago dealers, meanwhile, are reported to have taken no action on a proposal for a brief shutdown during the coming two or three weeks. Objections were raised to proposals for either complete or partial shutdowns, according to reports, and efforts are said to be continuing to arrive at some sort of a compromise on the matter. All other markets were very strong.

Knight Brothers Open At New Location

MIAMI, Fla.—Knight Brothers Paper Company is again located in a permanent building, after a five months' sojourn in temporary quarters, following the fire in January. This new location has air-conditioned offices, modern display rooms, and the warehouse faces a railroad siding, for more convenient handling of freight.

59 Students Enroll At Summer Tree Camp

STEVENS POINT, Wis. — Fifty-nine students had enrolled for the 1947 five-week summer school session, sponsored by the Wisconsin state teachers colleges at the Trees for Tomorrow, Inc., conservation camp at Eagle River, Wis., operated in cooperation with the United States Forest Service and the Wisconsin Conservation Department.

Many Paper Mills Close for Vacations

APPLETON, Wis. — Many paper mills and associated industry closed down for a week or more during the period which includes the Fourth of July. Others closed late July 3 and will resume work Monday morning, July 7. Among the latter are Kimberly-Clark's mill at Kimberly and the Riverside Paper Corporation.

The Atlas mill of Kimberly-Clark, Appleton, ceased production, with only maintenance and repair crews working, the evening of July 3 and will resume operations Monday morning, July 14.

Fox River Paper Corporation, Appleton, suspended operations to allow for employe vacations and mill maintenance and repair work for two weeks, from Sunday, June 29, until Monday morning, July 14.

Appleton Coated Paper Company closed down its mill Friday, June 27, and will resume production at 7 o'clock Monday morning, July 7.

Tuttle Press shut down at noon Saturday, June 28, and will start up again Monday morning, July 7, repair and maintenance work being done in the meantime.

The entire plant of the Appleton Wire Works is down for a week, beginning Monday, June 30, until Monday morning, July 7.

Murdock Joins Staff Of United Nations

ASHEVILLE, N. C.—Harold R. Murdock, of Asheville, chief of the pulp and paper branch, natural resources section of General MacArthur's Headquarters, Far East Command, has been appointed Far East member of the division of forests and forestry products of the United Nations Food and Agriculture Organization, according to information received here.

It is understood Mr. Murdock will work with the sub-committee concerned with the chemical utilization of wood and wood fibers. The UNFAO sub-committee at a recent meeting in New York decided to select two groups of specialists who will study the problem of chemical utilization of wood and wood fibers on a world-wide basis.

Industrial Building Continues in Volume

NEW YORK—The market for industrial engineering and building services has shown no indication of a recession during the past six months, O. F. Sieder, executive vice-president and general manager of the H. K. Ferguson Company, industrial engineers and builders, told the firm's board of directors in a semi-annual report this week. Mr. Sieder also disclosed that the company had observed definite trends toward building cost stabilization during the past two months. He said that for the first time since V-J Day the Ferguson company's cost curves had reflected no rise over a two-month period.

"The demand for new industrial engineering and building services is still so heavy that we have been forced into a policy of 'client selectivity'," Mr. Sieder said. "We are limiting our new business to filling plant requirements of old customers and to those fields in the chemical process industries where we have specialized know-how and experience."

Mr. Sieder said that the company has continued its expansion program in the chemical processing design departments of each of its three principal offices in accordance with a plan inaugurated during recent years. The effects of this plan which anticipated future personnel needs have been extremely beneficial in providing a supply of engineering personnel to execute the company's commitments.

In commenting on trends toward building cost stabilization, Mr. Sieder said that the company is now able to purchase most basic construction materials and many items of fabricated equipment without escalator clauses. Deliveries are such that construction schedules can be maintained with careful planning. He said that the principal exceptions are in the electrical field, where suppliers still have not caught up with demand.

Manpower in the construction trades is becoming increasingly available in most crafts, although bricklayers are still scarce. The productivity of craftsmen was also said to be increasing, but not enough to contribute toward a material reduction in costs.

Bulson Reelected President Of Mine Workers Local

TROY, N. Y.—James S. Bulson was reelected president of the local branch of the United Mine Workers at the annual meeting during the week. The local is composed of employes of W. & L. E. Gurley, manufacturers of papermakers' instruments. Other officers named included Elmer Viall, vice-president; Paul Tabor, recording secretary; Donald Brust, financial secretary; Raymond Lee, treasurer; and Charles Marks, guard. The plant committee includes Sherwood Collins, Franklin W. Lee and Wesley Heusser.

B. C. Pulp & Paper Starts Barker Pump

VANCOUVER, B. C.—While the complete barker and chipper plant at the Woodfibre branch of the British Columbia Pulp and Paper Company will not be in operation until later this year, the company is already making good use of a Bingham high pressure barking pump which was supplied to the mill and installed by Canadian Sumner Iron Works of Vancouver.

W. A. Bain, resident engineer at the Woodfibre plant discovered earlier this year that the 1300-lb. pressure pump and the necessary Westinghouse motor would be available for delivery this spring. He at once completed arrangements to install a temporary slab barker in the old sawmill.

Details for the conversion of a Statson Ross Cutter-head type slab barker and a new bark screen conveyor were worked out by Percy Bland at Woodfibre. A special header, with three nozzles were made up in the Canadian Sumner Iron shop to replace the knife head.

In March the screen conveyor was installed and then the next week-end before Easter, changes were made to the machine with no loss of production or shutdown.

Work started Sunday morning on the barker and pump installation, continuing right through Sunday night and Monday. Welders, pipe fitters and machinists, under W. McGreggor and Hilton Fowler, stayed right on the job with Bill Smith, Bill Bain and Percy Bland following the progress.

This mill cuts about 120,000 board feet in eight hours, breaking down logs into cants, about 10 to 12 inches square. Formerly cleaning of the outside cants was done on three knife barkers. Now this one hydraulic barker does all the debarking with big savings in wood and a smaller crew.

Eagle Lodge Wins Ten Cents At Stony Brook and Pearl City

HOLYOKE, Mass. — The negotiating committee of Eagle Lodge of Papermakers, AFL, representing employes of the Stony Brook and Pearl City divisions of American Tissue Mills, has declared that agreement has been reached with management for a new contract calling for a ten-cent-an-hour pay increase.

Robert C. Cameron, lodge president, said the workers accepted management's 10-cent hourly rate boost, after originally demanding an increase of 15 cents across the board. In addition to the wage raise, company executives also agreed to a checkoff system of dues payment. Cameron said he considered this a major victory, since the same committee, negotiating with heads of American Writing Paper Corp., failed to win this point in bargaining earlier.

Present at the final conference from the company were B. F. Perkins, president and general manager; Benjamin F. Perkins, Jr., vice-president; J. Lewis Perkins, Judge Philip O'Brien and Atty. Bertha Dean. From the ranks of labor were Cameron, William McFadden, Andrew Beaton and Edward M. Moore, organizer for the International Brotherhood of Papermakers.

JOHN L. RICHEY
Reports an active year in paper and twine.

Chicago Paper Group Stages Big Outing

CHICAGO—On Saturday, June 28, the Chicago Professional Paper Group put together its biggest party in history when a big crowd of members, guests and their families journeyed to Starved Rock State Park at Ottawa, Ill., for the 1947 outing at this noted scenic spot. Included in the program were golf, picnics, hiking, boat rides on the Illinois river, card games and even a playground for the children which permitted parents to "park" their hopefuls while they enjoyed the rest of the program. The dinner program in the evening was one of those "at your pleasure" arrangements where members ate at the Country Club, the Lodge or simply enjoyed a picnic supper.

Inland Daily Press Runs Paper Articles

CHICAGO—It would pay many members of the paper industry to write the Inland Daily Press Association, 7 S. Dearborn, Chicago, for its June 17 issue which contains a number of extremely interesting articles on "Newspaper Mechanics and Production." The current issue contains proceedings of a special session conducted at the Inland Spring meeting by its Mechanical Committee and topics discussed include "Color Pictures at Speed and Price of Black and White," "Milwaukee Journal's Experience in Run of Paper Color Work."

Paper, Twine Group Elects James Alcorn

FRENCH LICK, Ind. — James E. Alcorn, of Alling and Cory, Cleveland, was elected president of the Paper and Twine Association for the coming year. A heavy list of business was dispatched at two meetings devoted to association affairs, the membership list was declared to be filled, and those in attendance generally congratulated themselves on a highly successful meeting.

The thirteenth annual meeting of the Paper and Twine Association held at French Licks Springs on Friday and Saturday, June 20th and 21st, was not only the largest meeting we have ever had with 307 present but one of the most successful in every way.

The public relations program which the Paper and Twine Association attempted to establish was dropped due to the feeling of the National Paper Trade Association that this was a function of that organization. The board of directors pledged the cooperation of the Paper and Twine Association to them in the event they should decide to establish such a program.

No change in the 500 limitation on membership was made. The Association has now reached that number of members.

It was decided to hold the Fall luncheon of the Association at noon on Tuesday, October 28th, during the Fall convention of the National Paper Trade Association. The program for this meeting was left to the executive committee. A membership roster was authorized and left to the executive committee for handling. Retiring President Edgar A. Hall received the unanimous thanks of the board for his unusually successful administration.

On Friday morning, the 20th, in the convention hall of the French Lick Springs Hotel, practically the entire number of those present assembled and listened to an unusually fine panel discussion in which papers were read by Norman Beardsley, Crossett Paper Company; Gurney H. Stidham, Schwarz Paper Company; A. H. Seyler, The Cleveland Paper Company; E. J. Durkin, E. J. Durkin Company; and R. C. Johnson, Fletcher Paper Company. All of the papers being directed to the subject of improving relations between and among manufacturers, converters and merchants, the papers almost unanimously pointing to the fact that if the paper merchant adopted the policy of acting solely as

(Continued on page 16)

Putnam Heads Springfield Group

SPRINGFIELD, Mass. — Roger Lowell Putnam, chairman of the board of Package Machinery Company, has been appointed head of a 21-member Greater Springfield Council of the Massachusetts Fair Employment Practices Commission. He will serve without salary.

Newcombe, Donaldson Retire from P.-G.

NEW YORK—Three officers and two new directors were elected at meetings of stockholders and directors of Perkins-Goodwin Company held late in June. Louis Calder, president, said that the company had, with deep regret, accepted the resignations of Albert Newcombe, vice-president, and William H. Donaldson, secretary-treasurer, who due to ill health are retiring from active service. To succeed them, David I. Edwards was elected vice-president, and Avery J. Feiler was elected secretary.

Feiler also was elected a director as was Paul Scallan, now in charge of the company's Chicago office. Agnes V. Dugan was elected assistant secretary. All the new appointees have seen many years of service with the company.

Other employees with long service records now retiring include Stanley C. Willey, who is widely known in the pulp and paper field where he spent most of his business career, Joseph F. Gill, traffic manager, who has been with the company for 44 years. Richard F. Kist, who has been with the company for 15 years, has been appointed to succeed Mr. Gill.

The Perkins-Goodwin Company, which celebrated its one hundredth anniversary last year, is one of the largest and oldest firms in the Pulp and Paper Industry of America. Their activities include the distribution of pulp and paper as well as management and marketing counselling. The firm represents many Scandinavian, American and Canadian producers. In the paper field they are large distributors to printers, newspapers, book and magazine publishers throughout the country.

DAVID I. EDWARDS
Elected a P-G Vice-President

A. J. FEILER
New P-G Secretary

Patton Succeeds Knapp In Naval Stores Research

WASHINGTON—E. L. Patton has succeeded I. E. Knapp as head of the Department of Agriculture's Naval Stores Research Division, with headquarters at New Orleans, La. Mr. Knapp is taking an executive post with a commercial wood naval stores producing concern, the Department of Agriculture said.

Mr. Patton has been engaged in departmental naval stores research since 1933. For four years in the war he was in Army Ordnance, first as a captain, and as a colonel, upon completing his war service. Most of his research activity has been at the department's naval stores station at Olustee, Fla.

Mr. Patton received his chemical engineering degree at Georgia Tech.

Minnesota Awards Doctorate To Herman H. Chapman

NEW HAVEN, Conn. — Herman H. Chapman, Harriman Professor Emeritus of Forest Management at Yale University, received one of the two honorary degrees conferred this year by the University of Minnesota at its recent commencement exercises.

Professor Chapman, who was awarded the honorary degree of Doctor of Science, received his B.S. degree from the University of Minnesota in 1896 and his Master of Forestry degree from Yale in 1904. He was a member of the Yale faculty for 37 years, retiring from active teaching in 1943.

Well-known for his research on methods of regenerating and growing stands of Southern longleaf and loblolly pine, he is the author of many textbooks on forest management, forest mensuration, and forest finance.

An honorary fellow of the Society of American Foresters, of which he once served as president, Professor Chapman has also served as chairman of the Connecticut State Commission on Forest and Wild Life, and as president of the Connecticut Wild Life Federation.

Milton Names Marx To Vice-Presidency

NEW YORK—J. Milton, president of the Milton Paper Company, Inc., has appointed Paul N. Marx as vice-president of the organization. Mr. Marx has been with the Milton company for the past 24 years. In 1935, Mr. Marz was appointed a director of the firm.

He started in the paper business as an expeditor and purchaser of paper with the French Government. With this experience as a background, he decided to go into the paper jobbing business.

PAUL SCALLAN
Elected to Directorate

RICHARD F. KIST
P-G New Purchasing Agent

Frank Smith Joins Bulkley, Dunton, S. A.

NEW YORK — Frank W. Smith on July 1 became a vice-president of Bulkley, Dunton Paper Company, S. A., the paper export unit of the Bulkley, Dunton organization. A noted authority on the paper export business, Mr. Smith has a wealth of experience in the trade and is well-known in paper and graphic arts circles throughout the world.

Prior to his association with Bulkley, Dunton he was connected with the National Paper and Type Company for the past 34 years, where he held the titles of vice-president and director. He has traveled extensively in Latin America and Europe and has an intimate knowledge of the paper business in these countries. Mr. Smith has many friends among mill executives in the United States and Europe and enjoys a wide acquaintance in Latin America. His accomplishments as a paper export executive include complete familiarity with the Spanish and Portugese languages, both of which he speaks fluently.

Until recently president of the United States Exporters Council, Inc., Mr. Smith was instrumental in organizing that leading association of American paper exporters and has served it in some official capacity since it was founded several years ago.

St. Maurice Paper Starts Third Machine

MONTREAL — The third newsprint machine of the St. Maurice paper mill of Consolidated Paper Co., which is located at Cap de la Madeleine, opposite Three Rivers, is now in production. This is adding about 90 tons daily to the capacity of "Consolidated." Two machines were started up fairly late in 1946. The combined capacity of the three is about 270 tons daily, or upward of 80,000 tons per annum. A large percentage of this total thus will have been added to the 1947 capacity of the company as compared with conditions prevailing in 1946.

The St. Maurice paper mill, until operations were resumed, had been idle most of the time since 1930.

International Pays $8 Million On Unsecured Notes

NEW YORK—John H. Hinman, president of International Paper Company, declared this week that International Paper Company had paid on Monday a total of $8,000,000 on its unsecured two percent notes. This constituted a payment of $1,500,000 for the June 30 maturity and a prepayment of $6,500,000 spread pro rata over all subsequent maturities. This payment reduces the outstanding notes to $10,000,000 of which $909,090.91 mature December 31, 1947.

FRANK W. SMITH

Dirvin Retires After Thirty-One Years

PHILADELPHIA—Vincent A. Dirvin, after thirty-one years' service with Paper Manufacturers Co., has retired as secretary and general manager of the Paper Manufacturers Company. At a farewell banquet in his honor, held in the Traffic Club's private dining room in Benjamin Franklin hotel recently, president Frank A. O'Neill, Jr., gave a short talk, highlighting Vince's career with the company—how he went from the order desk to the sales force. And then, during World War I, how he was "drafted" for inside work, filling rush orders promptly, purchasing paper, handling most of the correspondence. It was a really sizeable job for one man. From there he went on to purchasing agent for the company, then sales manager, and finally secretary and general manager.

The company has appointed Thomas B. Dougherty as its new secretary and general manager. Mr. Dougherty, who started with the company when he was in his early teens, began by wrapping packages, after which he operated a knife grinder, wood lathe, then was shipper forman and subsequently superintendent.

Touring Industrialists Visit Warren Mill

WESTBROOK, Me. — Forty industrialists and technicians, in a tour of New England manufacturing plants, sponsored by the research committee of the New England Council, visited the mill of the S. D. Warren Company, June 17, seeing the progress which research has made in that plant.

Kimberly-Clark Change Superintendent's Office

NEENAH, Wis. — Changes in the Kimberly-Clark Corporation's general superintendent's office were reported by William Kellett in the May-June issue of *Cooperation*, K-C house organ.

Fred Seaborne is chief mill manager in full charge of all mills and has four immediate assistants—F. H. Werling, C. C. Porter, A. D. Wilkinson and A. R. Ellis.

Karl Sager replaces Clarence LeFebvre, retired, as head of the patent department and manager of paper patents.

R. K. Neller, assistant to Ernst Mahler, Kimberly-Clark executive vice-president, has been transferred temporarily to the GSO to establish new industrial engineering department and will act as chief industrial engineer. Three sections have been established, with C. W. Schueppert in charge of cost control and production standards. C. H. Abel of organizations and procedures, and Warren Whitlinger, man methods.

C. A. Fourness and W. H. Swanson comprise the office of chief of staff. Their first assistants are J. H. Murphy, A. R. Ellis, H. A. DuBois, George Clark, Harold Heller and J. R. Fanselow, with Austin Ely heading general office activity.

The engineering department remains under direction of J. T. Whelan, acting chief engineer, with C. G. R. Johnson, J. A. Foley, G. H. Spaulding and W. H. Cramer as heads of its four major sections.

H. A. Rothchild continues as head of the technical department with J. B. Catlin as his executive assistant. P. R. Eastwood and A. Byfield are in charge of two major sections, mill control and research, and development laboratories.

Aderhold Safety Director at Marathon's Michigan Plant

MENASHA, Wis.—Howard H. Aderhold, safety director at the Marathon Corporation plant here, assumed his new duties as personnel supervisor of the firm's Menominee, Mich., plant on Tuesday, July 1.

A graduate of Lawrence College at Appleton, he was employed by Marathon here since December, 1934, serving since 1937 in personnel work such as employment, insurance and safety. He was named safety director in 1942. His record has been commended as "outstanding" by the National Safety Council.

He is a member of the executive committee of the pulp and paper section of the National Safety Council and of the executive committee of the Wisconsin Council of Safety, with which he has been associated for several years.

Aderhold was president of the Twin City Safety Council several years ago and this year served as program director.

FINANCE

General Container Completes Merger

CLEVELAND—The officers of General Container Corporation, Muskingum Fibre Products Corp., and The Hunt-Crawford Company report that the shareholders of these three companies have ratified an Agreement of Merger, whereby the three companies will be combined into the one and will be known as General Container Corporation. The combined company will include the six plants of General Container Corporation which are now engaged in the manufacture of corrugated and folding and set-up boxes; the corrugated box manufacturing plant of The Hunt-Crawford Company, Coshocton, Ohio; and the straw paperboard mill of Muskingum Fibre Products Corp., Coshocton, Ohio.

General Container Corporation, with principal offices in Cleveland, was formed in 1927 and now operates the following plants: Cleveland Corrugated Box Company and the Great Lakes Box Company, Cleveland, Canton Corrugated Box Company, Canton, Ohio, Niagara Corrugated Container Company, Inc., Buffalo, N. Y., Albany Corrugated Container Corporation, Cohoes, N. Y., and the Dubuque Container Company, Dubuque, Iowa.

The Muskingum Fibre Products Mill was built in 1936 and manufactures .009 strawboard. The Hunt-Crawford Company was established in 1903 and is one of the oldest corrugated box manufacturing companies in the country.

The new board of directors will consist of the following: Dan L. Pickering, Lancaster, chairman of the board; Robert W. Agler, Cleveland, president and treasurer; G. D. Robinson, Cleveland, vice-president and secretary; C. T. Schunk, Cleveland, vice-president; E. G. Havighurst, Cleveland, vice-president; N. H. Carpenter, Jr., Coshocton, vicepresident; E. D. Hunt, Coshocton, vice-president. Other officers of General Container Corporation are P. F. Vandervort and W. H. Lamb of Canton, Ohio, and N. H. Carpenter, Sr., and H. B. Hunt of Coshocton, Ohio.

American Boxboard Subsidiary Acquires Filer Fibre

NEW YORK—The American Pulp and Paper Company, a new and wholly owned subsidiary of the American Box Board Company, late last week completed the purchase of the fixed assets and inventories of the Filer Fibre Company of Manistee, Mich., and the capital stock of the latter company's subsidiaries, the Leahy Timber Company, Ltd., of Ontario, Canada, and the Lone Wolf Timber Company of Grand Marais, Minn. Filer Fibre is a wholly owned subsidiary of the Continental Can Company of New York.

National Container Elects

LONG ISLAND CITY—At a directors' meeting of the National Container Corporation of Delaware, following the annual stockholders' meeting held on June 23, 1947, Harry Ginsberg was elected chairman of the board, Marshall M. Bernstein was elected secretary, and George J. Schneider, vice-president and general manager of the National Container Corporation of California, was elected a member of the board of the parent company—thus the three positions left vacant by the death of Abraham Herman were filled. All other officers were reelected.

Brown Offers Patents For Licensing

WASHINGTON—A total of 74 patents covering many newsprint, pulp and other paper and fiber manufacturing processes has been offered for license by the Brown Company, Portland, Me., according to announcement in the Patent Office Gazette last week. Included are patents for manufacture of pulp rovings, various cellulose treatment processes, deodorization of paper, construction of drier rolls, etc. The patents are offered "on reasonable terms" said the announcement.

Container Corporation Declares Extra 50¢ Dividend

CHICAGO—The Container Corporation of America this week declared an extra dividend of 50 cents in addition to the regular quarterly dividend of 50 cents on common stock. Both will be paid August 20 to shareholders of record August 5.

Plymouth Cordage Declares

BOSTON—The Board of Directors of the Plymouth Cordage Company, Plymouth, Mass., has declared a dividend of 60 cents per share on the common stock and of six cents per share on the employee's special stock, payable on July 18, 1947, to stock of record of June 30, 1947.

FINANCIAL RECORD OF THE WEEK

New York Stock Exchange

High, Low and Last for Week Ending June 28, 1947

STOCKS

	High	Low	Last
A. P. W.	4	4	4
Armstrong Cork Co.	43½	42½	43
Armstrong Cork Co., pf. 3¾	104¼	104	104¼
Celotex Corp.	24⅞	23⅝	24⅜
Celotex Corp., pf.	20⅞	20½	20¾
Certain-Teed Products Corp.	15¾	14⅜	15½
Certain-Teed Products Corp., pf.	....	....	....
Champion Paper & Fibre Co.	22⅞	21¼	22¼
Champion Paper & Fibre Co., pf.	105½	105½	105½
Congoleum Nairn Co.	26½	25¾	25¾
Container Corp. of America	40½	39	40
Container Corp. of America, pf. 4	100	99⅝	99⅝
Crown Zellerbach Co.	29½	28½	29⅛
Crown Zellerbach Co., pf. 4.20	103½	102½	102½
Crown Zellerbach Co., 4 pf. 4	113	112¾	112¾
Dixie Cup Co.	28½	27⅝	28½
Dixie Cup Co., A	52¾	51½	52½
Flintkote Co.	31	29½	30¼
Flintkote Co., pf.	107½	107	107½
Robert Gair	7½	6¾	7
Robert Gair, pf.	19¼	19	19
International Paper Co.	49⅛	46½	47¼
International Paper Co., pf.	104	104	104
Johns-Manville Corp.	44⅝	43	43
Johns-Manville Corp., pf.	....	....	....
Kimberly-Clark Corp.,	24½	23⅜	23½
Kimberly-Clark Corp., pf.	107¾	106½	107½
Mac Andrews & Forbes	36	34¾	36
Mac Andrews & Forbes, pf.	....	....	....
Marathon Corp.	24½	23¾	24
Mead Corp.	18½	17¾	18½
Mead Corp., pf. 4¼	92½	88¾	92½
Mead Corp., pf. 2	44⅜	44	44⅜
National Container Corp.	39⅛	38¾	39⅛
Paraffine Companies, Inc.	65½	64	65½
Paraffine Companies, Inc., pf.	....	....	....
Rayonier, Inc.	21⅜	20¾	21⅜
Rayonier, Inc., pf.	37¼	37	37
Ruberoid Co.	50½	48	50½
Scott Paper Co.	45	44¾	44¾
Scott Paper Co., pf.	100⅜	100	100⅜
Sutherland Paper Co.	....	....	....
Union Bag & Paper Corp.	32¼	30¼	32
United Paperboard Co.	14½	14⅜	14⅛
U. S. Gypsum Co.	101	98	99
U. S. Gypsum Co., pf.	....	....	....
West Virginia Pulp & Paper Co.	41	39	39
West Virginia Pulp & Paper Co., pf.	110⅝	110½	110⅝

BONDS

Abitibi Pulp & Paper Co., 5s '53	....	....	....
Celotex Corp., 3½s '60	104	104	104
Certain-Teed Products Corp., 5½s '53	....	....	....
Champion Paper & Fibre Co., 3s '65	103⅞	103⅞	103⅞
Mead Corp., 3s '66	....	....	....

New York Curb Exchange

High, Low and Last for Week Ending June 28, 1947

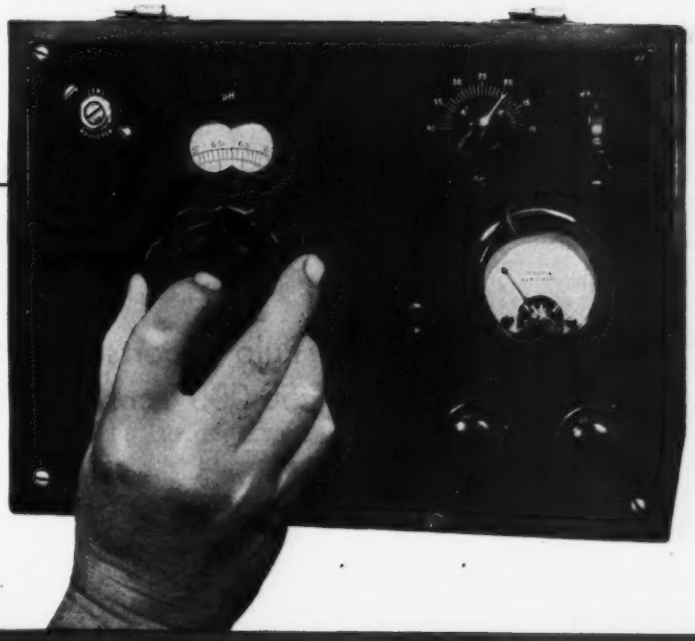
STOCKS

	High	Low	Last
Great Northern Paper Co.	42½	41½	41½
St. Regis Paper Co.	....	....	....
Taggart Corp.	8¾	8¾	8¾

BONDS

American Writing Paper Co., 6s '61	....	....	....

pH control



In the manufacture of fine paper, exacting pH control of the stock is vital to successful results. That is why only dependable chemicals of consistent uniformity and purity should be used. For alum and other paper-making chemicals that you can rely upon throughout your operations—

SPECIFY "GENERAL CHEMICAL"

ALUMINUM SULFATE

Standard—Ground, 99% thru 8 mesh, 95% thru 10 mesh; Powdered, 95% thru 100 mesh; also Lump.

Iron Free—Ground, thru 8 mesh; also Lump, approximately 2½".

SODIUM SILICATE

Solutions: From	Wt. Ratio
38° to 60° Baumé	(Na_2O to SiO_2) from 1:2.00-1:3.40

Appearance: Opalescent to clear.

GENERAL CHEMICAL COMPANY products for the paper industry

- Aluminum Sulfate, *Standard and Iron Free*
- Muriatic Acid *(Hydrochloric)*
- Sodium Fluoride
- Sodium Silicate
- Sodium Metasilicate
- Glauber's Salt, *Crystal and Anhydrous*
- Salt Cake
- Sodium Sulfide
- Sodium Hyposulfite
- Sodium Sulfite, *Anhydrous*
- Sodium Bisulfite, *Anhydrous*
- Disodium Phosphate
- Trisodium Phosphate
- Tetrasodium Pyrophosphate
- Sulfuric Acid
- Nitre Cake *(Sodium Bisulfate)*
- Nitric Acid
- Chrome Alum
- Aqua Ammonia

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In Canada: The Nichols Chemical Company, Limited • Montreal • Toronto • Vancouver

BASIC CHEMICALS

GENERAL CHEMICAL COMPANY

FOR AMERICAN INDUSTRY

Wausau Forest Fire Brought Under Control

WAUSAU, Wis,—A forest fire which raged early last week in timberlands owned by the Wausau Paper Mills Company, near Hearst, Ontario, were brought under control by June 25, according to a message received by Harold C. Collins, company president. At that time only smudges remained. The fire, which broke out Saturday, June 21, covered 17 square miles, Collins learned, of which 95 percent were slashings. Little green timber was destroyed, he said.

John Stevens, Jr., president of the Marathon Paper Mills of Canada, Ltd., was informed that the fire did not reach the Marathon timber limits in Ontario. At one time it was within two miles of the Marathon holdings, but a favorable wind kept the timber safe.

More than 1,000 men fought the forest fire, and were aided by rain and high humidity. The danger was reported over at Kapuskasing, where Chief Ranger W. J. Surrell greeted light rainfall with a sigh of relief. Patrols continued to stamp out the last traces of the fire.

Marathon put a spotter plane in the air and used every available lumberjack to help fight the fire. The company's Canadian mill is a Marathon, Ontario, on Lake Superior, and some distance from the fire.

Link Belt Names Hoefman Mfr. V. P.

CHICAGO — Link-Belt Company this week announced that Harold L. Hoefman had been elected a vice-president. Effective July 1, Mr. Hoefman becomes vice-president in charge of manufacturing. He has been general manager of the Pershing Road plant of these important suppliers to the paper trade since 1943. He entered the employ of the company in 1920 as a draftsman. It was also reported that David E. Davidson, head of the engineering department at Pershing Road, has now been appointed general manager of this plant.

Canadian Sumner Works Represents Kennedy & Sons

VANCOUVER, B. C.—Canadian Sumner Iron Works Ltd. has been appointed as British Columbia representatives by the William Kennedy & Sons Ltd. of Owen Sound, Ontario. The Kennedy organization was established in 1857 and during its 90 years in the foundry and engineering field has specialized in marine work and equipment for the pulp and paper industry.

During the war years the engineering staff of the Kennedy organization and that of the Canadian Sumner Iron Works at Vancouver, worked in close cooperation in designing and building steam hydraulic steering gears for naval craft.

Now both companies are associated in the development of pulp and paper equipment and during a recent visit to eastern Canada Norman Terry, secretary-treasurer of the Canadian Sumner Iron Works Ltd. completed arrangements whereby his company would manufacture and sell Kennedy pulp and paper mill equipment in British Columbia.

T. Imbleau of the pulp and paper mill division of the Kennedy organization has now visited B.C. and completed the arrangement.

Pulp Imports Rose by 50,000 Tons in May

WASHINGTON—Imports of wood pulp into the United States from all sources totaled 175,067 short tons in May 1947 as compared with 123,985 tons in May 1946, the Department of Commerce reported this week. Canada ranked as the principal supplier in May of both years, according to the Forest Products Division, Office of International Trade. Imports from Canada in May 1947 totaled 125,411 tons, an increase of 21,582 tons over May 1946.

Imports from Sweden in May 1947 were 43,333 tons or 29,556 tons more than in the same month of last year. Pulp imports from Finland amounted to 5,868 tons in May, while a year ago 6,379 tons were received. No pulp was received from Norway in either this May or May 1946.

Of total imports of all grades in May, 19,616 tons were of rayon and special chemical grades of bleached sulphite, and the balance, 155,451 tons, was paper grade pulp.

United States consumption of imported pulp by paper mills in recent months averaged around 150,000 tons a month; March consumption increased to 158,684 tons.

Mexican Mill Will Use Banana Stalks

LOS ANGELES—A plan for newsprint from bamboo, banana stalks and other Mexican vegetation was recently disclosed here.

A $9 million factory, designed to produce 200 tons of pulp daily, is promised to be in full operation within two years near Tampico, Mexico, according to Robert A. Trumpis, head of Trumpis-Collar & Associates.

A by-product of newsprint and paper pulp will be caustic soda, used in bleaching and soap making. Mr. Trumpis said the so-called Pasqualucci process produces low-cost newsprint that is stronger, whiter and more resistant to ink penetration than present newspaper.

The project will be financed equally by American capital, Mexican investors and the Mexican Government's equivalent to the Reconstruction Finance Corporation. Mexican private capital will be represented by Señor Eduardo Suarez, Mexico's Finance Minister for twelve years.

Forest Service Urges Better Wood Economy

WASHINGTON—Manufacture of pulp and paper share a large part of the blame for wood waste in the Forest Service report "Wood Waste in the United States" just issued by the agency.

Charging that more than half the annual timber cut is wasted or burned, the Forest Service said:

"Largest amount of wood waste occurs in manufacture of logs into lumber, pulp, paper, veneer, etc., or what is called primary manufacture."

Based on 1944 figures, the Forest Service report said waste in those operations throughout the country reached 52,900,000 tons, or 49 percent of the total cut.

"Of this," the report continued, "pulping operations showed a loss of 8,600,000 tons of lignin, cellulose, sugars and other chemical components and wood fiber."

For better wood waste utilization, the report recommended among other steps, greater integration of timber products industries, "for example, sawmills with pulp and paper mills"; also, extension of sustained yield forest management, research to find ways of making old products with less waste, and new ways of using wood waste."

New York State Council Opposes Taft-Hartley Bill

UTICA, N. Y. — About 75 delegates attending the convention of the New York State Council of Paper Mills, Pulp Mills and Converting Plants in the Labor Temple went on record opposing the Taft-Hartley labor bill and urged President Truman to veto the act. Principal speakers were City Judge Walsh, Frank B. Mercurio, assistant state commissioner of labor, and Donald Rood, representing Rocco F. DePerno, president Utica Trades and Labor Assembly, AFL.

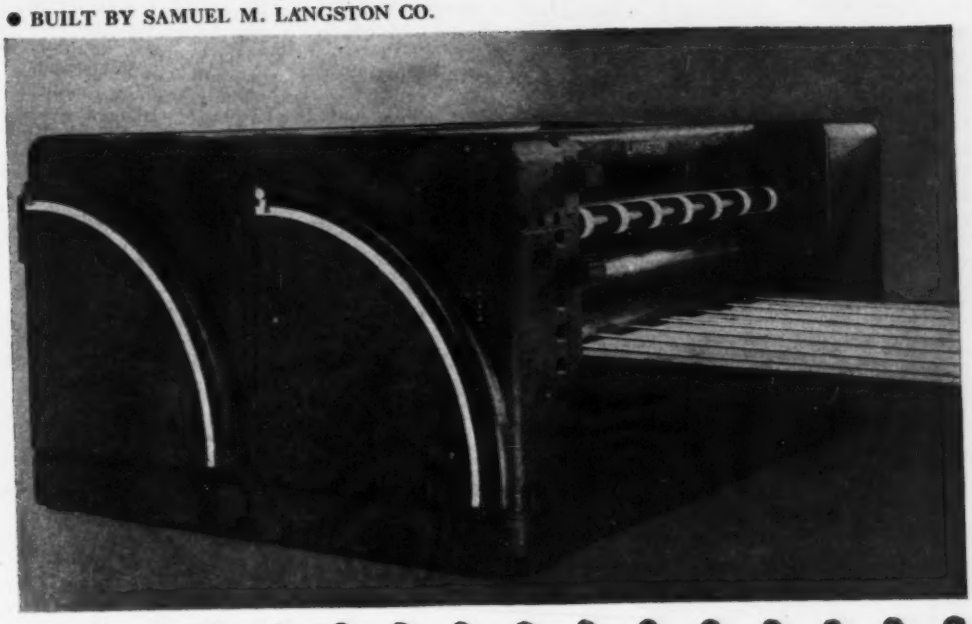
Changes in the constitution of the Council were made pertaining to democratic procedure in election of officers and complying with the International Brotherhood constitution.

It was announced the Council would do everything in its power to further and improve harmonious relationship between workers and employers to bring about satisfactory settlements and understanding. Ronald Nolan, Niagara Falls, president of the Council and secretary of the Niagara Falls Federation, presided.

National Container Split Approved By Stockholders

CHICAGO — The National Container Corporation stockholders recently approved an increase in common shares from 1,500,000 to 4,000,000 to permit a split. A resolution to split the outstanding 840,009 shares will be adopted at a meeting of the directors to be held soon.

● BUILT BY SAMUEL M. LANGSTON CO.



A Cut-Off

That Depends Upon 62 SKF Bearings!

What SKF's invention of the spherical roller bearing means to modern paper machinery is easily discernible in the smooth performance of the 92" Double Rotary Cut-Off. This cut-off is used on the corrugating machine to cut continuous web into blank sizes. Its main knife drums depend upon eight SKF Spherical Roller Bearings to carry heavy loads . . . to compensate for shaft deflections, distortions or weave . . . to assure smooth, steady and low-cost running. In addition, 54 SKF Ball Bearings give a good account of themselves on other vital locations. In the Paper Industry, SKF has earned its position as the preferred bearing. 6282

SKF INDUSTRIES, INC.
Front St. & Erie Ave., Philadelphia 32, Pa.

Paper, Twine Group Elects James Alcorn

(Continued from page 9)

the sales representative of manufacturers and converters instead of as purchasing agent for merchant customers and at the same time did everything possible to improve his merchandising ability and if the manufacturer and converter looked largely to the paper merchant as his sales representative then much of the friction and inefficiency of the system of paper distribution would be eliminated.

Dr. Harry Lewis, Dean of the Institute of Paper Chemistry, who attended the meeting was introduced by the chairman. Also, Ray Bee of Southern Kraft Corporation was introduced as the founder of the Paper and Twine Association.

The meeting adjourned at 12:00 noon for luncheon after which a large number of those present played golf or just rested until 7:30 p.m. when Miss Ruth Best presented her annual elaborate show in connection with the banquet in the main dining room.

On Saturday morning, the 21st, the annual meeting was called to order by President Hall and after the usual routine items of business were disposed of the chairman of the resolutions committee, Frank Vaughan, was introduced.

A resolution was then presented congratulating Secretary John L. Richey on his administration of the affairs of the Association and giving him a bonus of $500 for the year 1947.

A resolution of appreciation for 12 years faithful service of Miss Mary A. Chieco, Mr. Richey's secretary and assistant was then passed, Chairman Vaughan presenting a resolution in rhyme.

At this point, two amendments to the Constitution were presented through which the term of a president of the Association is limited to one year and the board of directors limited to seven persons consisting of the president, vice-president, secretary-treasurer and the four most recent past presidents; these amendments were unanimously passed. At this point, President Hall made his annual report and in closing asked for the support of the membership in the work of the Association and in concluding his remarks in his usual gracious manner, he presented beautiful sterling silver ash trays suitably engraved to Secretary Richey, to Vice-President J. E. Alcorn and to Marshall Reinig for his work in the public relations program.

At this point, a nominating committee previously appointed by the president, presented nominations for officers as follows:

For president, James E. Alcorn of The Alling and Cory Company, Cleveland, Ohio; for vice-president, Roth Herrlinger, Gummed Products Company, Troy, Ohio; for secretary-treasurer, John L. Richey. The president then called for further nominations from the floor and there being none offered the foregoing nominees were unanimously elected.

The president introduced the newly elected officers after which the gavel was turned over to the new president, Jim Alcorn, who pledged his best efforts for the future of the organization.

At this point, Frank Vaughan, chairman of the resolutions committee, presented a resolution of appreciation to retiring President Ed Hall which was adopted by a standing vote.

The meeting adjourned at noon for luncheon and the second afternoon of golf was indulged in by those present followed by a banquet in the evening at which Chairman Joe Druth of the tournament committee presented the prizes.

The board of directors of the Paper and Twine Association as now constituted is as follows: J. E. Alcorn, Roth Herrlinger, John L. Richey, Edgar A. Hall, E. P. Magel, E. J. Durkin and C. V. Jewell.

Commerce Dept. Reports Container Demand Sound

WASHINGTON — Container demand still exceeds the supply in most instances, says the Department of Commerce. Nor, the statement continued, is "the current high-level demand either inflated or unsound."

"The consuming public wants more and more packaged products and in certain fields—such as produce, meats and frozen foods—packaging is undergoing a tremendous expansion."

Research carried on by various groups, it was reported, is developing new types of packaging. Containers or wrappers are scheduled to appear shortly, that are designed to permit the ultimate purchaser to use them for other purposes. These new-type containers will be on dealers' shelves within the next few months, the Department said.

Packaging now requires a wide variety of materials including glass, tin, cellophane, paper, folding boxboard and steel.

OBITUARY

A. L. de Olloqui

HOLYOKE, Mass. — A. L. de Olloqui of Holyoke and Rexton, N. B., Canada, died recently at his home in Rexton, following an illness of several months.

He was born at Rexton July 17, 1886, son of Dr. R. A. de Olloqui, a native of Bilbau, Spain, and Jane Sutherland de Olloqui, whose former home had been in Pictou, Nova Scotia. He spent his early life in New Brunswick and attended St. Joseph's University there. In 1920 he married Vera Cahill of Holyoke, who survives with a daughter, Mrs. Francis W. Kenney, and grandson, Alan, also of Rexton.

For thirty years, Mr. de Olloqui had acted as selling agent for H. Waterbury & Sons Company of Oriskany, N. Y., and in February, 1945, he was elected vice-president of the company.

"Al" de Olloqui was well-known and had a host of friends in the paper industry throughout the United States. In recent years, he had traveled for the most part only in the Middle West and Northwest, where he will be sorely missed by his many friends and associates.

Donald Wise Perin

GREENFIELD, Mass. — Donald Wise Perin, 53, prominent consulting engineer who had been engaged in that capacity for the Erving Paper Mill, died recently in Brookline, N. H., following several months of failing health.

Joseph C. Brown

GREENWICH, N. Y. — Joseph C. Brown, for many years superintendent of the Stevens & Thompson Paper Co., died recently following an extended illness at his home in Middle Falls. He was 80 years old. The principal survivor is a daughter.

James C. Whitelaw

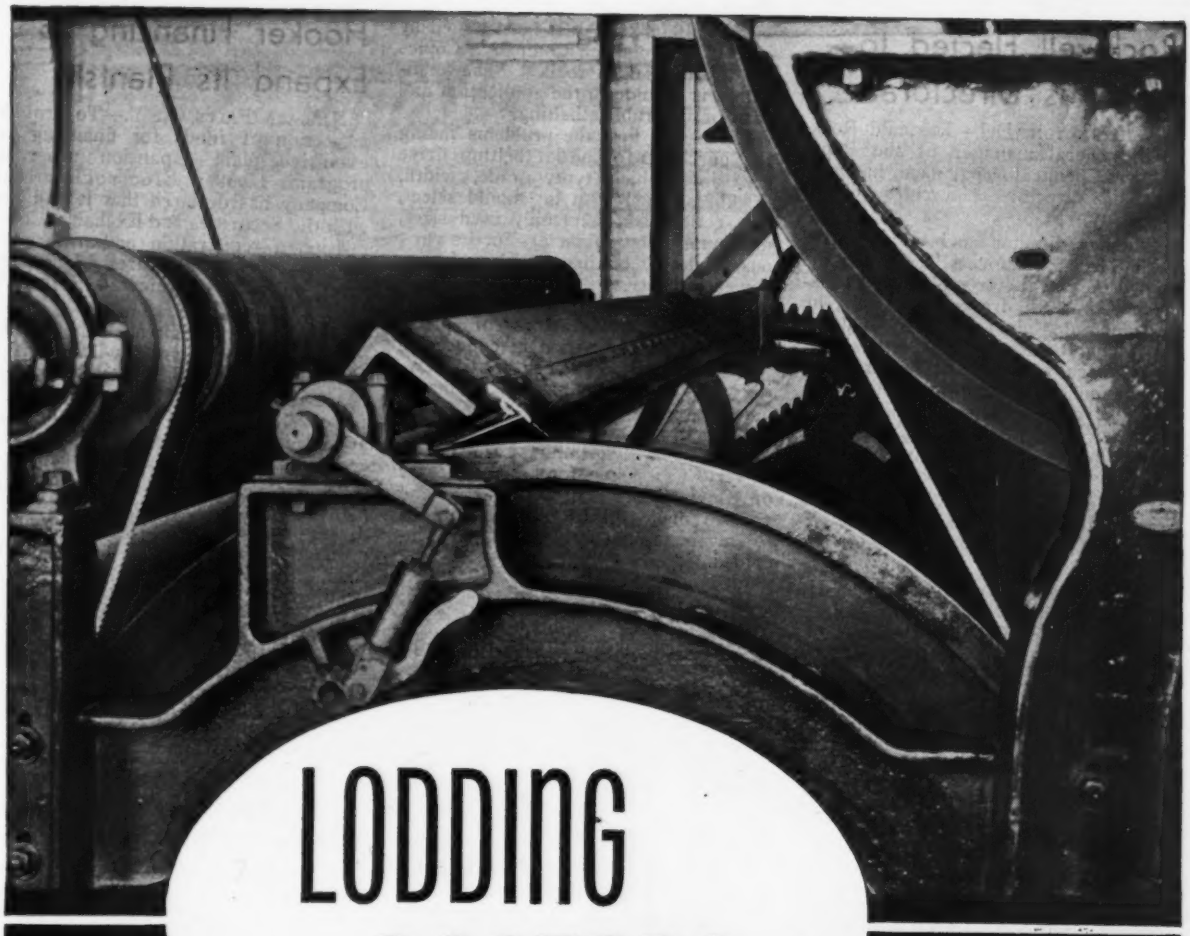
SEATTLE — James C. Whitelaw, 54, vice-president and manager of Blake, Moffitt & Towne, died suddenly early in June after having suffered a cerebral hemorrhage.

A native of Canada, "Jim" Whitelaw, as he was known to his many friends in the trade, spent his boyhood in Chicago, later attending the University of Illinois where he was graduated in 1915. Following his service as a lieutenant in the Army Air Corps during World War I, he went to Seattle to begin his career in the paper business with the Mutual Paper Company. When Blake, Moffitt & Towne purchased this company in 1928, he continued as sales manager of the wrapping paper department. In 1940 he was made manager of the company's new division in Spokane and three years later was appointed manager of the Seattle Division.

Active civicly in Seattle, Jime Whitelaw was a member of the College Club, the Rotary Club, Rainier Club and the Chamber of Commerce. Surviving are his widow, Anne, and two brothers, Gordon, Seattle, and Hugh Whitelaw, Birmingham, Michigan.

William J. Brady

BUFFALO, N. Y.—William J. Brady, 60, night superintendent of the F. N. Burt Co., died recently at a local hospital. Born in Utica, Mr. Brady came to Buffalo 30 years ago and had been connected with the paper products company for 17 years. His wife, two sons and two daughters survive.



LODDING DOCTORS

Is your steam free? Clean dryers mean less steam. Lodding Engineering Corporation

Worcester, Massachusetts

Represented by W. E. Greene Corporation

Woolworth Building, New York

Rockwell Elected to Hercules Directorate

WILMINGTON, Del.—Reginald Rockwell, general manager of the Paper Makers Chemical Department, has been elected a director of Hercules Powder Company.

The new director has been associated with Hercules since 1922 when he joined the naval stores plant at Brunswick, Ga., as a draftsman. Later, he was appointed plant engineer. In 1926, he transferred to the Hattiesburg, Miss., naval stores plants as assistant superintendent. Both of these plants produce rosin, turpentine, and pine oil and their derivatives which are used in the paper, paint, varnish, textile, soap, insecticide and other industries.

Mr. Rockwell returned to Brunswick as assistant superintendent in 1938. He was made plant manager the following year.

At the outbreak of World War II, he was appointed manager of Volunteer Ordnance Works, Chattanooga. This plant, operated by Hercules, produced TNT for the Army.

Mr. Rockwell became assistant general manager of the Paper Makers Chemical Department in 1944, and was appointed general manager of that department in September, 1946.

Monsanto Transfers Fisher To Central Research

DAYTON, O. — Hart U. Fisher, instrumentation engineer, has been transferred by Monsanto Chemical Company to its Central Research Department in Dayton from its Clinton Laboratories at Oak Ridge, Tenn., Dr. Carroll A. Hochwalt, Central Research director for Monsanto, announced. Fisher will be in charge of the instrumentation project being initiated by the Monsanto Chemical Company, and will work closely with all Monsanto plants on problems connected with the instrumentation of processes and operations.

Fisher, a graduate in mechanical engineering from Washington University in St. Louis, has been employed by Monsanto since 1933. Starting at the Monsanto, Ill., plant, he later was instrument engineer at the Texas City, Tex., plant of the company, and for the past two years has been supervisor of the instrument department at Clinton Laboratories, at Oak Ridge, Tenn., operated by Monsanto for the Atomic Energy Commission.

Fisher, his wife and two daughters will reside in Dayton. A third daughter is married and resides in Texas City.

Goodrich Presents Study On Rubber Belting

AKRON, Ohio—Featured by a wealth of tables and other technical data, a new 12-page catalog section on "Selection and Maintenance of Rubber Transmission Belts" has just been issued by The B. F. Goodrich Company. Copies are available upon request. The publication is a guide to the application and care of flat rubber belting.

Discussing first the problems facing the purchaser of a flat belting drive regarding which type, grade, width, thickness and length he should select, the section lists commonly used sizes, minimum pulley diameters for its various grades of belting and their horsepower capacity.

Among features of the section is a table of service factors of prime movers, which are used in connection with the rate horsepower of the driving unit to determine the estimated horsepower requirement used in selecting a belt.

Rules for determining the horsepower, the formula for finding the arc of contact, length of open drive and crossed endless belts, correct lengths to cut belts and belt speeds are included.

Hooker Chemical Appoints Horace Hooker Purchasing Agt.

NIAGARA FALLS, N. Y.—The officers of the Hooker Electrochemical Company announced the appointment of Horace W. Hooker, Jr., as purchasing agent for the company. Mr. Hooker has been associated with the company since 1934 when he was employed in the research and development department.

During the next year he was engaged as special assistant to John F. Bartlett who was purchasing agent and office manager. From 1940 to 1941 he was assistant to the sales manager, R. W. Hooker. In this capacity, Horace Hooker was in charge of sales promotion and advertising. From 1941 until his recent promotion he was assistant purchasing agent at the Niagara Falls office.

HORACE W. HOOKER, JR.
Buys for Hooker Chemical

Hooker Financing to Expand Its Plants

NIAGARA FALLS, N. Y.—To provide a portion of funds for financing an extensive plant-expansion program, program, Hooker Electrochemical Company has declared that it will file with the Securities and Exchange Commission a registration preparatory to the sale of 110,000 shares of no-par-value cumulative preferred Series A stock.

Of the approximately $11,000,000 gross proceeds, Hooker will use $5,200,000 to redeem the outstanding 50,000 shares of $4.25 cumulative preferred stock at $104 a share, the announcement said. The rest of the proceeds will be available for expansion.

"The company is planning further plant expansion for the production of diversified chemicals and for increased production of chlorine and caustic soda," the announcement said. "Expenditure of not less than $8,000,000 over a period extending into 1949 is contemplated for these purposes."

Hooker's net income for the six months ended May 31 totaled $1,098,996, equal to $3.96 a share. Sales for the six months were $9,989,935. No comparison is available.

Photograph Paper Supply Catches Up With Demand

ROCHESTER, N. Y. — Reduction of working hours to 32 a week in the paper division of Kodak Park, affecting 1,500 employees, was ascribed by Eastman Kodak Company officials to a slump in demand from customers for photographic papers.

This condition is in contrast to demand for film, which, a company spokesman says, continues at a record high production by the company.

Announcement of the cutback appeared on bulletin boards in Kodak Park's paper division. It said in part:

"For some time there has been a marked falling off in orders by customers for our paper products. As a result production has been exceeding sales. Consequently, it has become necessary to reduce production schedules.

"The company regrets that for these reasons it will be necessary for the paper division to start operations on a 4-day 32-hour work week beginning Sunday, June 22."

The announcement said that the schedule change does not affect vacations which will be paid on the basis of a 40-hour week, and holiday allowances will be paid in accordance with regular procedure.

That dealers' shelves are stocked with photographic paper was indicated also by announcement that the Haloid Company and Defender Photo Division of E. I. duPont and Company each have laid off around 100 employes in recent weeks.

If you need a long-life compressor... one that has the stamina to generate Air Power continuously at full capacity, 24 hours every day, week after week... *you need an Ingersoll-Rand Class "ES."*

This heavy-duty compressor is designed, built, tested, and rated for severe service throughout many years. In addition, it is the most efficient, trouble-free single-stage compressor available. For these reasons an "ES" will save you hundreds, perhaps thousands, of dollars during its lifetime.

Whenever you have problems concerning Air Power... its generation, its distribution, or its thousands of labor-aiding uses... call on an I-R Engineer. He can help you in many ways.

WITH "ES"

Heavy Duty COMPRESSORS

- Sizes 5 to 125 hp.
- Liberal valving with Channel Valves.
- Free-air unloaders on each inlet valve.
- Thorough water-jacketing around all valves.
- Completely accessible, oil-tight frame.
- Double-row Timken bearings.
- Constant-speed control; or dual control, permitting either constant-speed or automatic-start-and-stop.
- Pressures 5 to 150 psi single stage.
- Also to 500 psi two-stage; 2500 psi three-stage.
- V-belt, flat-belt, or drive by synchronous motor mounted on crankshaft. Also steam drive with steam cylinder between air cylinder and frame.

Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y. 1-772

COMPRESSORS · AIR TOOLS · ROCK DRILLS · TURBO BLOWERS · CONDENSERS · CENTRIFUGAL PUMPS · OIL AND GAS ENGINES

TRENDS

Office of the PAPER TRADE JOURNAL,
Wednesday, July 2, 1947.

Major markets for paper and paperboard maintain their firmness with no signs of easing. Minor gray markets are weakening to a point where some spot market sales are only slightly above normal. Such easing, however, is not indicative of the general trend in paper and board which continues steady. Non-integrated mills that have been paying high spot market prices for wood pulp and other raw materials are finding it increasingly difficult to produce products at prices acceptable to their customers. Upgraded wrappings, boxes and multiwall sacks are avoided as consumers shop around for standard grade items at contract price levels. Demand for text papers remains very heavy with little easing noticed in the large backlog of orders. Sulphite writing and book papers are more plentiful, but still far from meeting demand. Indications are that supplies of Christmas boxes and wrappings will show considerable improvement over last year. While set-up boxes may fall short of the Christmas rush, paper box makers in general have expressed some concern over increasing use of transparent and plastic gift packages. Inadequate supplies of chemicals, dyes, and adhesives still hamper converting operations. Converters report a slightly improved supply of paper and board, but find such items as napkins, towels, kraft paper, and toilet tissue unevenly distributed as to grades. While paperboard production is currently at a higher rate than last year, demand continues well ahead and as a result consumers of board and many of its products are still feeling the pinch.

The index of general business activity for the week ended June 21 declined to 144.7 from 146.4 in the previous week, compared with 132.9 for the corresponding week in 1946. The index of paperboard production dropped to 183.7 from 187.1 in the previous week, compared with 164.6 for the corresponding week in 1946.

Paper production for the week ended June 21 was estimated at 105.8 percent, compared with 107.2 for the preceding week, with 106.2 percent for the corresponding week in 1946, with 90.4 for 1945, with 90.8 for 1944, and with 87.0 percent for the corresponding week in 1943.

Paperboard production for the week ended June 21 was 102.0 percent of capacity, compared with 103.0 percent for the preceding week, with 97.0 for the corresponding week in 1946, with 96.0 for 1945, with 96.0 for 1944, and with 96.05 percent for the corresponding week in 1943.

Production and shipments of newsprint in Canada during May were at new highs. The records were made despite a loss of several thousand tons as a result of abnormal weather conditions and floods according to the Newsprint Association of Canada. May had 27 working days, compared with the average month of 25¾ days. Canadian shipments for the month totaled 400,763 tons, or 9.1 percent greater than in May 1946. Shipments to the United States increased by 7.9 percent over May 1946. Shipments to Canadian consumers were 14.1 percent higher than for the like month last year, while overseas shipments were 14 percent greater. The shipments represented 105.4 percent of capacity, compared with 102.8 percent in April and 98.2 percent in May 1946. Canadian production for the month was 384,520 tons, an increase of 24,577 tons, or 6.8 percent over May 1946. Production represented 102.2 percent of capacity, compared with 101 percent in April and 96.3 in May 1946. Shipments exceeded production by 16,243 tons and there was a corresponding decrease in stocks held by Canadian manufacturers.

The marvels of paper research are unending. We now hear of a metal-coated paper used for insulation. Developed first for use on Quonset huts in the South Pacific, the metal coating, one-tenth the thickness of the thinnest aluminum sheet made today, is said to afford insulation against the elements comparable to that afforded by four-inch thicknesses of rock wool. The new "silver-cote" paper is calculated to save up to 42 percent in household heat losses. . . . Paper that can be eaten, also a wartime development for spies who might be obliged to eat the evidence, is described as being made of cellulose with a casein filler. . . . Another war born paper now being manufactured for civilian use is one which can be burned without leaving a trace. . . . Then, too there is the special type of sealing paper which may be made into containers for secret documents. The paper is described as foolproof, any attempt to break the seal showing up immediately. . . . Latest reports indicate that soon there will be a proper paper for use when writing under water with the much-advertised ball-point pens.

Wood Pulp

Total imports of wood pulp during the first 4 months of this year were about 2 percent over those for the same period last year. Swedish and Finnish imports were down 28 percent from a year ago, but imports from Canada, of which a little more than half was market pulp, were more than 17 percent higher, entirely offsetting the net decline in European shipments during the first 4 months of 1947. Imports of wood pulp from Norway during this period were a net gain, since that country shipped no pulp to the United States last year.

Consumption of wood pulp has been at a somewhat diminishing rate since January as compared with the month to month rate last year, though for the entire period it was still 10 percent over the comparable period in 1946. Consumption of the sulphite pulps remained about the same, a moderate increase in the bleached grades being offset by a proportionate decline in unbleached.

Old Rope and Bagging

Paper mill demand for old rope is not heavy. All activity, however, is conducted at the recent price level. Domestic Manila rope is still $5.75 to $6.50 per 100 pounds f.o.b. New York. Jute strings are around $4.50 and No. 1 sisal strings close to $5.50. Mixed strings are slightly under $2.50.

Market for bagging is quiet with paper mills easing their demands. Some trading is still going on with No. 1 foreign gunny taken up at $4.75 per 100 pounds f.o.b. mills New York. Domestic gunny is closer to $4.25.

Rags

Summer shutdowns of paper mills have had a noticeable effect on the rag market. Some mills, however, are still very active in securing new cotton cuttings. Paper mills continue to take up all the white shirt cuttings they can get and seldom pay less than $12 per 100 pounds delivered plus dealer's commissions. Unbleached muslin is also strong at the $12 level. Blue overalls stay $7.75, and washables $4.

Waste Paper

Most paper mills have ceased or curtailed buying waste paper during their vacation period. The market, however, is steady with little or no easing in prices of the better grades.

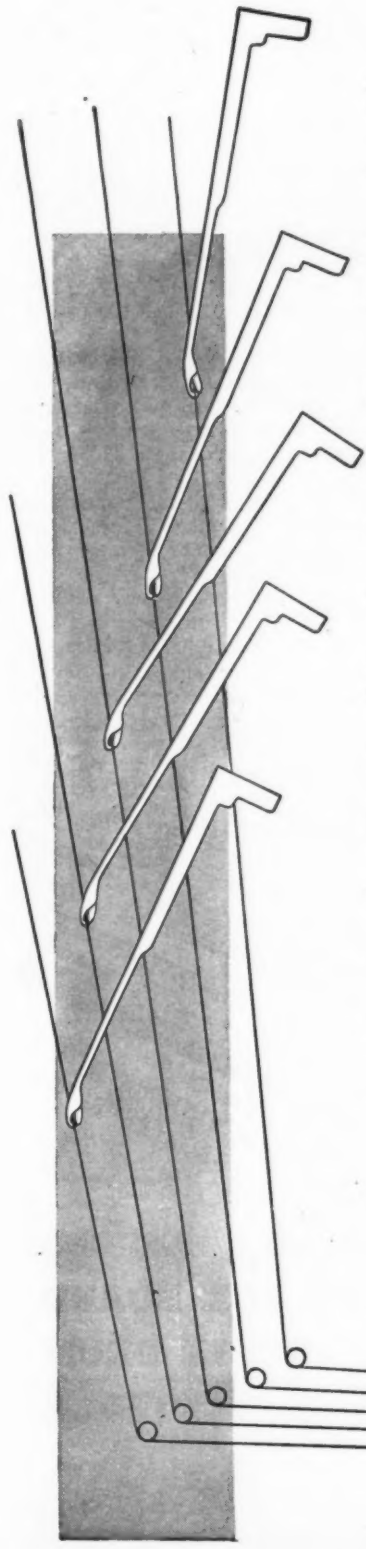
Paper mills are paying upwards of $100 to $120 a ton for No. 1 hard white envelope cuttings. No. 1 soft white shavings are $85. Old corrugated is $28, No. 1 news close to $19, and No. 1 white ledgers about $60.

Wisconsin Company Reservoir Shows First Loss for June

WAUSAU, Wis. — Reservoirs of the Wisconsin Valley Improvement Company showed a loss of 247,000,000 feet of reserves during the week which ended June 22, the first loss since May. Total reserves June 22 were 15,703,000,000 cubic feet, as compared to 12,741,000,000 cubic feet on the same date in 1946 and 16,054,000,000 cubic feet on June 22, 1945.

WE INVITE YOU TO PUT TENAX FELTS TO THE TEST

. . . . . OUR SERVICE TO THE PROOF



The enlargements and betterments in progress at our plant are designed to increase our facilities to serve you and to continuously improve each **TENAX FELT** that we make for you.

It is our expression of confidence in the future of the paper-making industry and our desire to serve it . . . and to serve you . . . with felts of longer and longer life that cut your production costs and keep your machines running full out and trouble free.

We have been a partner-in-service to the paper-makers of the country for 56 years and in that time have established many pleasant relationships that have been of profit both to our customers and ourselves. If you are one who has yet to put **TENAX FELTS** to the test or our service to the proof, we invite you to afford us that opportunity.

LOCKPORT FELT COMPANY
NEWFANE, N. Y.

TENAX
"TENAX FELTS ARE TOUGH"

SERVING THE PAPER INDUSTRY SINCE 1891

MARKETS

BLANC FIXE — Demand steady, with supplies adequate, deliveries fair. Pulp is currently quoted at $55 per ton, in barrels, car lot, at works; and $60 less car lots same basis.

BLEACHING POWDER—Supplies tight although paper mill demand has eased up. Shipments improved. Quotations are unchanged. Prices on bleaching powder range from $2.75 to $3.75 per 100 pounds.

CASEIN—Current prices on processed acid precipitated casein are reported around 24 to 26 cents per pound for domestic grades and 28 to 32 cents for imported grades f.o.b. shipping point.

CAUSTIC SODA—Market continues tight, relief expected as new production arrives. Solid caustic soda is reported at $2.50 to $2.75 per 100 pounds; flaked and ground offered at $2.90 to $3 per 100 pounds, car lots, at works.

CHINA CLAY—Demand continues heavy, supply tight. Domestic filler clay is currently $9 to $11 per ton, car lots. Coating clay is currently $15 to $30 car lots. Imported clay is currently quoted at from $18 to $35 per ton, in car lots, export warehouse.

CHLORINE—Strong demand continues in a tight market. Lack of tank cars continues to hamper deliveries. Quotations unchanged. Chlorine is currently quoted at $2 to $3.50 per 100 pounds.

ROSIN—Gum Rosin in drums, per 100 pounds, net, in yard New York, car lots, B, D, E, $8.90; F, G, H, I, K, M, N, WG, $9.05. WW, $9.31. Wood Rosin per 100 pounds, l.c.l., f.o.b. N. Y., B, $6.95; FF, $8.45; G, H, I, $8.81; WG, WW, $8.91, X, $9.01.

SALT CAKE—Demand continues to increase as supply shows little improvement. Prices remain unchanged. Domestic salt cake is quoted at $20 to $26 per ton in bulk. Chrome salt cake is quoted at $20 to $26 per ton.

SODA ASH—Demand active as supplies continue short, previous orders filled. Contract orders prevail at the same high levels. Current prices, car lots, per 100 pounds, are as follows: in bulk, $1.08; in paper bags, $1.20; and in barrels, $1.60.

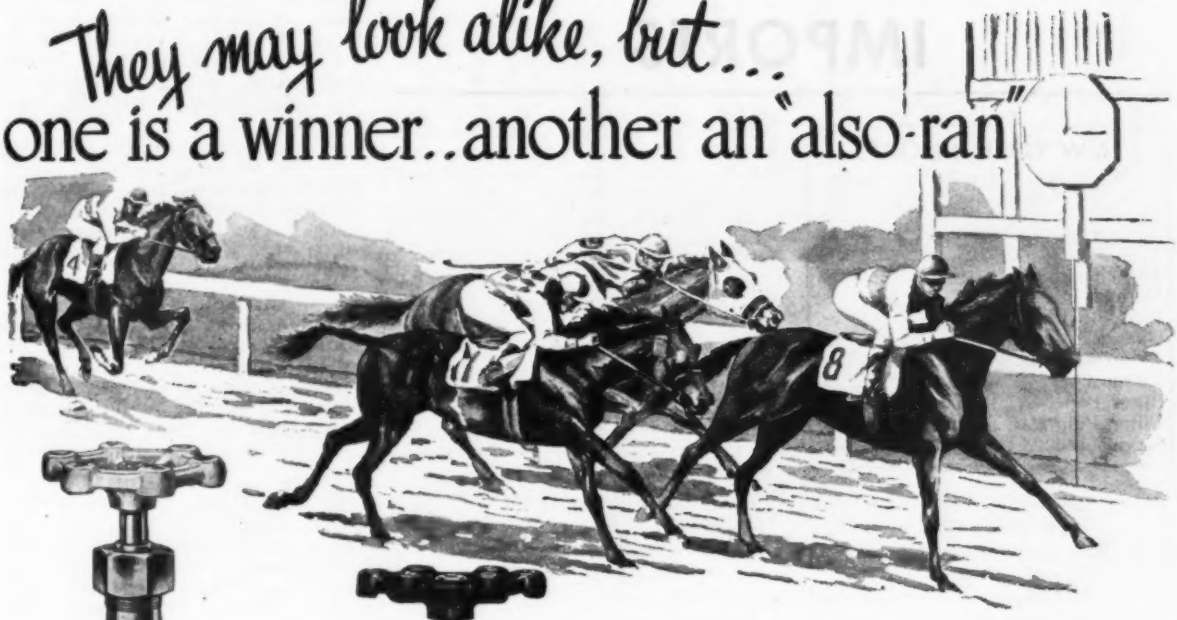
STARCH—Capacity production absorbed by active demand, export demand eased up. Starch prices continue strong with the pearl grade quoted at $5.57 per 100 pounds; powdered starch at $5.68 per 100 pounds, car lots, Chicago.

SULPHATE OF ALUMINA — Active demand covered by fair supplies. Quotations continue unchanged. The commercial grades are quoted at from $1.15 to $1.30 per 100 pounds, in bags, car lots, f.o.b. works. Iron free is quoted at $1.95 to $2.25 per 100 pounds, in bags at works.

SULPHUR—Plentiful supplies to meet active domestic and export demands. Annual contracts are quoted at $18 per long ton, f.o.b. mines; the price f.o.b. at Gulf Ports is $19.50 per long ton.

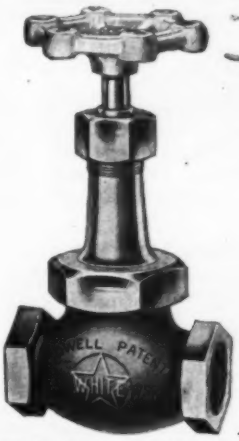
TALC—Domestic and French grades are moving in fair volume with prices steady. Domestic grades are currently quoted at from $16 to $30 per ton at mines; Canadian at $35 to $45 per ton. All prices in car lots.

They may look alike, but...
one is a winner..another an "also-ran"



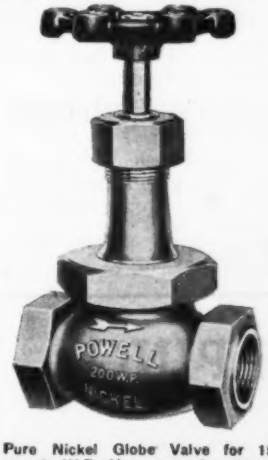
Call it "heart", "staying power", or what you will, some thoroughbreds have what it takes to win.

Now let's consider valves!



200-pound Bronze Globe Valve. Screwed ends, union bonnet, renewable, specially heat treated stainless steel seat and regrindable, renewable, wear resisting "Powellium" nickel-bronze disc.

Stainless Steel Gate Valve for 150 pounds W.P. Has screwed ends, screwed-in bonnet and inside screw rising stem.



Pure Nickel Globe Valve for 150 pounds W.P. Has screwed ends and union bonnet.

Stainless Steel O. S. & Y. "Y" Valve for 150 pounds W.P. Has flanged ends and bolted flanged bonnet.

Compare the outward appearance of any Powell valve with that of other valves of the same type and size. You'll probably see very little difference. *It's the things you don't see that give Powell valves the "staying power" that makes them winners.*

There's nothing mysterious about these things. They're merely the result of the continual progress in design, knowledge of materials, and quality of workmanship that comes from more than a century of making valves—and valves only—for American industry.

For the last 25 years, to meet the ever-growing demands of the Chemical and Process Industries, Powell has been building a complete line of Corrosion-Resistant Valves in many special designs and the widest range of pure metals and alloys ever used in making valves.

The Wm. Powell Company
Cincinnati 22, Ohio

DISTRIBUTORS AND STOCKS IN ALL PRINCIPAL CITIES

POWELL VALVES

IMPORTS

NEW YORK IMPORTS

WEEK ENDING JUNE 28, 1947
SUMMARY

Newsprint	9815 rolls
Wall Paper	37 pkgs.
Paperhangings	45 bls., 11 cs.
Wallpaper	1 bl., 1 cs.
Drawing Paper	14 cs.
Gummed Paper	48 cs.
Photo Paper	5 cs.
Tissue Paper	12 cs.
Filter Paper	29 cs.
Filter Pulp	5 bls.
Strawboard	216 rolls

NEWSPRINT

R. A. Olsen Co., Inc., G.T.D., Donnacona, 376 rolls.
International Paper Co., International No. 1, Gatineau, 306 rolls.
R. A. Olsen Co., Inc., Newscarrier, Donnacona, 395 rolls.
News Syndicate Co., Inc., Colabec, Baie Comeau, 7635 rolls.
R. A. Olsen Co., Inc., Donpaco, Donnacona, 375 rolls.
H. G. Craig Co., G.D.D., Donnacona, 383 rolls.
R. A. Olsen Co., Inc., Kermic, Donnacona, 303 rolls.
D. C. Andrews & Co., Stavangerfjord, Oslo, 42 rolls.

WALLPAPER

J. T. Veroloet & Co., Creighton Victory, Rotterdam, 37 pkgs. (handpainted).

PAPERHANGINGS

W. H. S. Lloyd & Co., American Farmer, London, 45 bls., 11 cs.

WALLPAPER

Meadows Wye & Co., American Farmer, London, 1 cs.
(———), American Farmer, London, 1 bl.

DRAWING PAPER

J. E. Bernard & Co., American Farmer, London, 1 cs.
Stevens Nelson Paper Corp., American Farmer, London, 3 cs.
H. Reeve Angel & Co., Inc., American Farmer, London, 5 cs.
Caldwell & Co., Ambrose E. Burnside, Havre, 5 cs.

GUMMED PAPER

B. F. Drakenfeld & Co., Tortuguero, Liverpool, 48 cs. (not printed).

PHOTO PAPER

J. J. Gavin & Co., American Farmer, London, 5 cs. (unsensitized).

TISSUE PAPER

F. C. Strype, Tortuguero, Liverpool, 12 cs.

FILTER PAPER

H. Reeve Angel & Co., Inc., American Farmer, London, 29 cs.

FILTER PULP

Green Kriegsman Paper Co., Fort Cadotte, London, 5 bls.

STRAWBOARD

Guaranty Trust Co., West Linn Victory, 58 rolls.
American Can Co., West Linn Victory, Rotterdam, 158 rolls.

RAGS, BAGGINGS, ETC.

E. J. Keller Co., Inc., Creighton Victory, Antwerp, 197 bls. old bagging.
Darmstadt Scott & Courtney, Creighton Victory, Antwerp, 91 bls. old waste jute bagging.
O'Brien Products, Inc., Pioneer Gem, Shanghai, 100 bls. cotton waste.
Lush Cotton Products Co., Pioneer Gem, Shanghai, 217 bls. cotton waste.
Padawer Corp., Pioneer Gem, Shanghai, 439 bls. cotton waste.
Cecil Kutz, Pioneer Gem, Shanghai, 50 bls. cotton waste.
W. J. Green & Co., Inc., West Linn Victory, Antwerp, 275 bls. jute waste.
Castle & Overton, Inc., Mount Davis, Bombay, 200 bls. old jute rags.
E. J. Keller Co., Inc., Mount Davis, Bombay, 100 bls. old jute rags.
Brandwein Mazur Co., Mount Davis, Bombay, 100 bls. cotton waste.
Crane & Co., American Farmer, London, 19 bls. grey linen cuttings.
Irving Trust Co., American Farmer, London, 54 bls. old khaki webbing.
Lush Cotton Products Co., Hoegh Silverlight, Bombay, 100 bls. cotton waste.
(———), Hoegh Silverlight, Bombay, 560 bls. old khaki webbing.
O'Brien Products, Inc., Dona Nati, Shanghai, 100 bls. cotton waste.
Loumar Textile By Products, Inc., Dona Nati, Shanghai, 250 bls. old waste bagging.

GLUESTOCK, ETC.

Darmstadt Scott & Courtney, Buenos Aires, Buenos Aires, 121 bls. dry gluestock.
Darmstadt Scott & Courtney, Buenos Aires, Recife, 61 bls. dry gluestock.
H. Remis, Cape Nome, Havana, 375 bls. dry gluestock; 20 bls. fleshings.

WOODPULP

Pulp Sales Corp., Bloomington Victory, Kotka, 7493 bls. white dry mechanically ground woodpulp; 19,810 bls. prime unbleached kraft sulphate pulp; 1214 bls. prime extra strong bleached sulphite pulp; 1310 bls. prime strong unbleached sulphite pulp.

BOSTON IMPORTS

WEEK ENDING JUNE 28, 1947

Pulp Sales Corp., Normandiet, Rauma, 1825 bls. kraft sulphate pulp; 1300 bls. extra strong bleached sulphite pulp; 5617 bls. strong bleached sulphite pulp.
Pulp Sales Corp., Ragnhildsholm, Kotka, 12,677 bls. unbleached kraft sulphate pulp; 1550 bls. strong unbleached sulphite pulp.
Jay Madden Corp., Ragnhildsholm, Kotka, 1978 rolls wrapping paper.
Madden Reeve Angel & Co., Inc., Ragnhildsholm, Kotka, 336 rolls newsprint.
Empire Fibre Co., Dona Nati, Shanghai, 200 bls. cotton waste.

PHILADELPHIA IMPORTS

WEEK ENDING JUNE 28, 1947

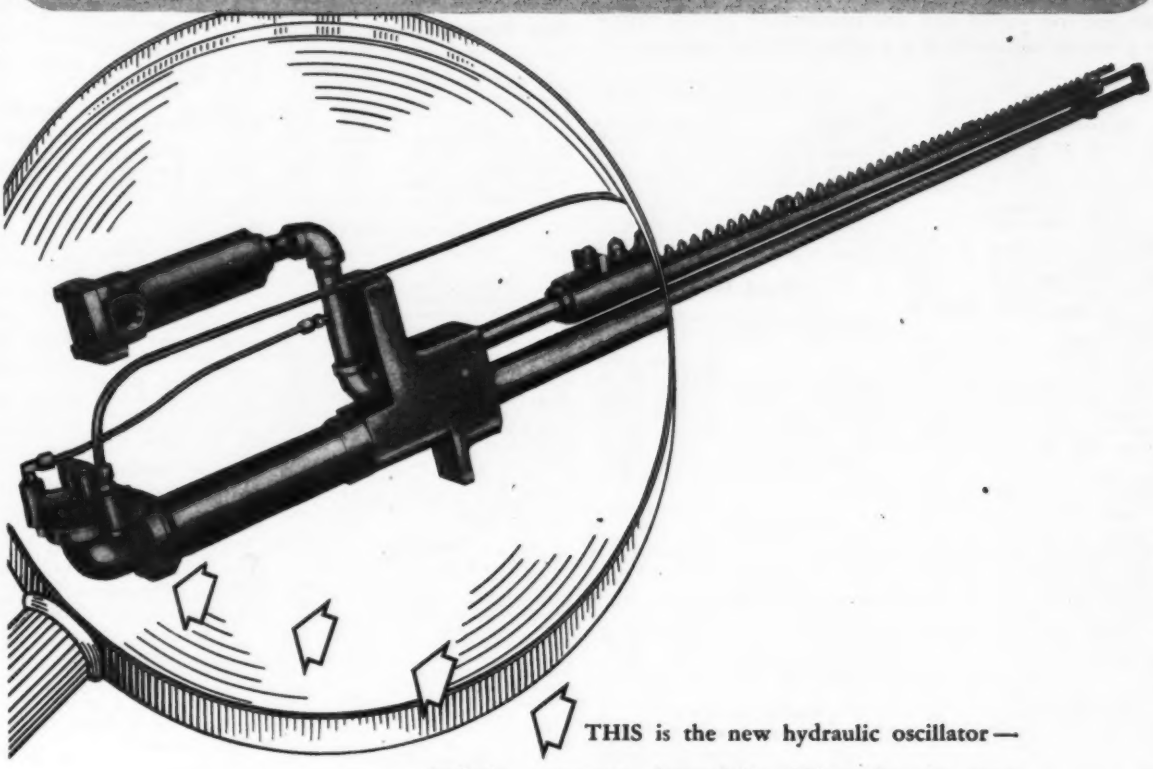
Pulp Sales Corp., Normandiet, Rauma, 10,903 bls. strong bleached sulphite pulp; 1765 bls. strong unbleached sulphite pulp.
Camden Fibre Mills, Hoegh Silverlight, Bombay, 77 bls. cotton waste.

MEISEL MACHINERY IS HELPING IN ALL FIELDS

Cigarette	Wax	Photographic	Jet Propulsion
Condenser	Grease Proof	Snap-out Forms	Aero-engine Parts

MEISEL PRESS MFG. CO. 950 Dorchester Ave., Boston

THE BROUGHTON S-13-H SHOWER is now *Hydraulically Oscillated*



THIS is the new hydraulic oscillator — built-in, automatic, dependable. Driven by the same water that passes through the shower, all electrical or power shaft connections are eliminated and installation is quick and simple in any head box cylindrical screen. There is no water waste, for even the discharge from the oscillator (less than one gallon per minute) is reused to lubricate the deckle strap! For more details of the benefits and savings you can derive from the patented S-13-H write for complete descriptive bulletin.

A. E. BROUGHTON & COMPANY, *Glens Falls, N. Y.*

We also manufacture the S-10-H Oscillating Showers for cleaning cylinder moulds, felts, Fourdriniers, etc., and Unit Vacuum Controls for paper machine suction boxes.

PRICES

With the elimination of price controls on paper, pulp, rags and other materials, the quotations given below once more become indicative of trends in an open market. At the moment they can be of little more, for, while some volume business still is being done under contract at the figures given below, fluctuations representing special conditions are too varied and too frequent to permit prices to be given as representing a wholly stabilized market.

Paper

(Delivered New York)

Standard News, per ton—
Roll, contract ....$90.00 to —
Sheets .....$109.00 " —

Kraft—per cwt.—Carload Quantities
Zone A, Delivered
40 lb. base weight

Superstandard Wrapping ..... $7.00 to —
No. 1 Wrapping... 6.50 " 6.75
Standard Wrapping 6.00 " 6.25
Standard Bag .... 5.75 " 6.25

Tissues—Per Ream 24x36 (480) 10 lb. Zone 1.
Wh. No. 1 Frd..... 1.35 to 1.65
Wh. No. 1 M. G.... 1.35 " 1.65
Wh. No. 1½..... 1.20 " 1.45
Wh. No. 2 ..... 1.30 " 1.55
Wh. Anti-Tar ..... 2.75 " 4.25
Kraft Unbl. ..... 1.45 " 1.85
Manila No. 2 ..... 1.25 " 1.45

Toilet—Per Case of 100 rolls—1 M Sheets.
Unbleached ..... 4.47 to 5.50
Bleached ..... 6.50 " —

Paper Towels—Per Case of 3750—Zone 1.
Wh. C. fold 11x13½ 4.39 to 4.80
Br. Sgl. fold 10 in. 2.67 " 3.00
Br. M'tif'd 9½x14¾ 3.78 " 4.15
Br. M'tif'd 9½x9¼ . 2.67 " 3.00

Manila—per cwt.—C. l. f. a.
No. 1 Jute..... 11.25 to —
No. 1 Manila 35 lb. 6.00 " 7.00

Boards, per ton—
News .....$92.50 " —
Chip ..... 90.00 " —
Sgl. Mla. L1 Chip*102.50 " —
White Pat. Coated*120.00 " —
Kraft Liners 42 lb. 95.00 " —
Binders Boards ..126.00 " —

* Base Prices per 10 tons. Less than 10 tons but over 3 tons, add $2.50; three tons or less, add $5; regular 35-39 basis, add $5; basis 40-49, add $2.50; basis 91-100, add $2.50; basis 101-120, add $5.

The following prices are representative of distributors' resale prices, all deliveries in Zone 1: Rag Content Bonds and Ledgers—

White, Assorted Items
Bonds, per cwt.

	Carton	4 C't'n	Ton
100% Rag Ext. No. 1	$55.00	$50.00	$48.00
100% Rag	46.50	43.00	41.25
75% Rag	35.00	32.50	31.50
50% Rag	31.50	28.75	27.50
25% Rag	28.00	25.50	24.50

Ledgers, per cwt.

100% Rag Ext. No. 1	$54.25	$50.00	$48.00
100% Rag	46.25	42.50	40.75
75% Rag	36.00	33.25	31.75
50% Rag	31.00	28.00	27.00
25% Rag	27.25	24.75	23.75

Sulphite Bonds and Ledgers—White, Assorted Items
Bonds, per cwt.

No. 1	$18.75	$16.25	$15.50
No. 2	17.00	15.25	14.50
No. 4	16.00	14.50	14.00

Ledgers, per cwt.

No. 1	$17.00	$17.00	$16.35
No. 2	17.75	16.25	15.50
No. 4	17.00	15.00	14.25

Free Sheet Book Papers—White, Cased Paper

(Per cwt.)	Case	Ton
No. 1 Glossy Coated...	$19.40	$18.60
No. 2 Glossy Coated...	18.15	17.35
No. 3 Glossy Coated...	17.65	17.00
No. 1 Antique (Water marked)	$14.90	$14.25
No. 2 Offset	15.35	14.70
A Grade E. F.....	13.90	13.30
A Grade S. & S. C.....	14.40	13.70
B Grade E. F.....	Nominal	
B Grade S. C.....	Nominal	
C Grade E. F.....	Nominal	
C Grade S. C.....	Nominal	
D Grade E. F.....	Nominal	
D Grade S. & S. C.....	Nominal	

Wood Pulp

Domestic mill prices delivered with former OPA freight allowances.

	Per Short ADT
Groundwood	$75.00 to $80.00
Unbleached Sulphite.	115.00 " 117.00
Bleached Sulphite ..	121.00 " 125.00
Bleached Soda	115.00 " 120.00
Unbleached Kraft ...	112.50 " 120.00
Southern Kraft	90.00 " 102.50

Canadian mill Prices delivered with freight allowances unless otherwise specified:

	Per Short ADT
Select Unbleached Kraft (no freight allowance)	115.00 " —
Unbleached Sulphite.	115.00 " 117.00
Glassine Unbleached Sulphite (no freight allowance)	112.00 " —
Bleached Soda	105.00 " 115.00
Groundwood	75.00 " 80.00
Sideruns Pulping News	75.00 " 80.00
Hardwood and Specialty Grades	Nominal

Swedish Quotations
Ex. dock, New York

	Per Short ADT
Bleached Kraft	$150.00 to 156.00
Bleached Sulphite ...	151.00 " 158.50
Unbleached Sulphite..	121.00 " 131.00
Unbleached Kraft	116.00 " 126.00

Finnish Quotations
Ex. dock, New York

	Per Short ADT
Bleached Sulphite	$165.00
Unbleached Sulphite	132.50
Unbleached Sulphite (special grade)	137.50
Unbleached Sulphate	132.50
Unbleached Sulphate (special grade)	159.00

New Domestic Cotton Cuttings

(Prices delivered Mill Plus Dealer's Commission)

White Shirt	$11.50 to	$12.00
Light Silesias	7.50	
Unbleached Muslin ...	11.50 "	12.00
White Back Blue Overalls	8.25	
Blue Overalls	7.75	
Unbl. Fancy Shirt....	4.50 "	5.00
Light Percales	5.50 "	6.00
Light Prints	5.25 "	5.95
Washables	4.00	
Bleachable Khaki	5.50 "	6.00
Unbleachable Khaki ..	5.00 "	5.50
Cottonades	4.50 "	5.00

Old Domestic Cotton Rags

(F.O.B. Shipping Point Plus Dealer's Commission)

	Per 100 lbs.
No. 1 Whites Repacked.....	$5.00
No. 1 Whites Miscellaneous..	4.25
No. 2 Whites Repacked.....	4.00
No. 2 Whites Miscellaneous..	3.50
Blue Overalls	3.75
Thirds and Blues Repacked..	3.00
Thirds and Blues Miscellaneous	2.50
No. 1 Roofing Rags.....	2.20
No. 2 Roofing Rags.....	2.10
No. 3 Jute Bagging.....	2.00
No. 4 Brussels and hard back carpets	2.00
No. 5A Roofing Rags.....	2.00

New Foreign Cotton Cuttings

(Prices delivered Mill)

	Per 100 lbs.
New Dark Cuttings....	$6.00 to —
New Mixed Cuttings...	6.50 " —
Light Silesias	9.00 " 10.00
Light Flannelettes	8.00 " 9.00
New White Cuttings ..	13.00 " 15.00
Fancy Shirt Cuttings...	9.00 " 10.00
Light Prints	8.00 " 10.00
Bleachable Khaki, No. 1	7.00 " 7.50
Unbl. Khaki, No. 1....	6.25 " 6.75

Old Foreign Rags

(F.O.B. New York)

	Per 100 lbs.
No. 1 White Linens...	$14.00 to 16.00
No. 2 White Linens...	12.00 " 13.00
No. 3 White Linens...	8.00 " 9.00
No. 4 White Linens...	8.00 " 9.00
No. 1 White Cottons...	10.00 " 12.00
No. 2 White Cottons...	8.00 " 9.00
No. 3 White Cottons...	6.50 " 7.00
No. 4 White Cottons...	5.00 " 5.50
Extra Light Prints....	7.50 " 8.00
No. 1 New Light Prints	6.25 " 6.75
Med. Light Prints.....	5.25 " 5.75
Dutch Blue Cottons....	5.25 " 5.50
Checks and Blues.....	4.00 " 4.25
Linsey Garments	3.00 " 3.75
Dark Cottons	2.50 " 3.00
Old Shopperies	2.50 " 3.00
New Shopperies	2.50 " 3.00

Bagging

(Prices to Mill, f.o.b. N. Y.)

	Per 100 lbs.
Foreign Gunny, No. 1..	$4.75 to 5.00
Domestic Gunny, No. 1	4.25 " 4.50
Light Wool Tares.....	4.50 " 4.75
Heavy Wool Tares.....	4.75 " 5.00
Bright Bagging	4.25 " 4.50
Foreign Manila Rope...	6.00 " 7.00
Domestic Manila Rope	5.75 " 6.50
Jute Strings	4.50 " 5.00
No. 1 Sisal Strings ..	5.50 " 6.00
Mixed Strings	1.75 " 2.50

Waste Paper

Prices to Mills
(Dollars Per Ton)
F.o.b. New York, Baled

No. 1 Hard White Envelope Cuts, one cut	$100.00	@	$120.00
No. 1 Hard White Envelope Cuts ..	90.00	"	100.00
No. 1 Hard White Shavings, unruled..	100.00	"	110.00
No. 1 Hard White Shavings, ruled ...	80.00	"	90.00
Soft White Shavings, one cut	95.00	"	105.00
No. 1 Soft White Shavings	85.00	"	95.00
Soft White Shavings, Misc.	65.00	"	75.00
No. 1 Fly Leaf Shavings	55.00	"	60.00
No. 2 Fly Leaf Shavings	50.00	"	55.00
No. 1 Groundwood Fly Leaf Shavings	30.00	"	33.00
No. 2 Mixed Groundwood Fly Leaf Shavings	(nominal)		
Mixed Colored Shavings	(nominal)		
Mixed Groundwood Colored Shavings...	(nominal)		
Overissue Magazines..	(nominal)		
No. 1 Heavy Books & Magazines	30.00	"	37.50
Mixed Books	15.00	"	20.00
No. 1 White Ledger..	60.00	"	65.00
New Manila Envelope Cuttings, one cut..	100.00	"	110.00
New Manila Envelope Cuttings	65.00	"	75.00
Extra Manilas	35.00	"	40.00
Mixed Kraft, Env. & Bag Cuttings	75.00	"	85.00
Kraft Envelope Cuttings	100.00	"	105.00
Triple Sorted, No. 1 Brown Soft Kraft.	60.00	"	70.00
New 100% Kraft Corrugated Cuttings ..	60.00	"	70.00
No. 1 Assorted Old Kraft	40.00	"	50.00
New Jute Corrugated Cuttings	27.00	"	—
Old 100% Kraft Corrugated Containers.	(nominal)		
No. 1 News	19.00	"	20.00
No. 1 Mixed Paper..	17.00	"	19.00
Box Board Cuttings..	20.00	"	—
White Blank News...	75.00	"	80.00
Overissue News	(nominal)		
Old Corrugated	28.00	"	30.00
Mill Wrappers	22.00	"	25.00

Twines

All Prices Nominal
(F. o. b. Mill)
(Soft Fiber)

Coarse Polished—India	.26	@	.29
Fine Polished—Fine India	.31	"	.35
Unpolished—Paper Makers	.29	"	.26
Tube Rope	.22	"	.27½
Wrapping	.26	"	.33½
Cotton	.70	"	—
(Hard Fiber)			
Mex. Sisal	.21	"	.24
Manila	.33	"	—
(Hemp)			
Polished Hemp	.63	"	—

PHILADELPHIA

Domestic Rags (New)

(F.O.B. Eastern Shipping Point)

Shirt Cuttings—			
New White No. 1..	.10½	@	.11
New White No. 2..	nominal		
Light Silesias	.07½	"	.08
Black Silesias, soft	.06½	"	.07
New Unbleached ..	.10½	"	.11¼
Washable Prints ..	.06½	"	.07
Washable No. 1....	.05	"	.05½
Blue Overall	.07½	"	.08
Cottons—According to grades—			
Washable Shredding	.03½	"	.04
Fancy Percales ...	.06¾	"	.07¼
New Black Soft....	nominal		
Khaki Cuttings—			
Unbleachable Cotton Cuttings	.05½	"	.06
Bleachable Cotton Cuttings	.06½	"	.07
Men's Corduroy ..	.05½	"	.06
Ladies' Corduroy ..	.05	"	.05½
Cottonades	.05½	"	.06

Domestic Rags (Old)

(F.O.B. Eastern Shipping Point)

White No. 1—Repacked	4.50	@	5.00
Mixed White	4.00	"	4.25
White No. 2—Repacked	3.50	"	3.75
Thirds and Blues—			
Miscellaneous	2.25	"	2.50
Repacked	2.75	"	3.00
Roofing Stock—			
Foreign No. 1.....	nominal		
Domestic No. 1....	2.00	"	2.05
Domestic No. 2....	1.90	"	1.95
Roofing Bagging ..	1.90	"	1.95
Old Manila Rope....	5.75	"	6.00

Bagging

(F.O.B. Eastern Shipping Point)

Gunny No. 1—			
Foreign	nominal		
Domestic	4.25	@	4.50
No. 1 Clean Bright—Sisal Strings	.04	"	.04½
No. 2 Clean Bright—Sisal Strings	.03	"	.03½
Sisal Jute	.02¾	"	.03
Scrap—			
No. 1	3.25	"	3.50
No. 2	1.75	"	1.85

Wool Tares, heavy	4.00	"	4.25
New Burlap Cuttings	6.00	"	6.50

Old Papers

(F. o. b. Phila.)

Mill Prices, Baled

No. 1 Hard White Envelope Cuts, one cut	$100.00	@	$115.00
No. 1 Hard White Shavings, unruled	100.00	"	—
Soft White Shavings, one cut	90.00	"	95.00
White Blank News	60.00	"	65.00
Soft White Shavings	80.00	"	—
No. 1 White Ledger	75.00	"	80.00
Ledger, colored	60.00	"	65.00
No. 1 Heavy Books & Magazines	40.00	"	45.00
Overissue Magazines	nominal		
New Manila Envelope Cuttings	80.00	"	—
No. 1 Assorted Old Kraft	60.00	"	65.00
No. 1 Mixed Paper	20.00	"	—
Box Board Cuttings	20.00	"	—
Kraft Corrugated Cuttings	nominal		
Old Corrugated	30.00	"	35.00
Overissue News	40.00	"	—
No. 1 News	—	"	30.00

BOSTON

Old Papers

(F. o. b. Boston)

Mill Prices, Baled

No. 1 Hard White Shavings, unruled	7.00	@	8.00
No. 1 Hard White Shavings, ruled	7.00	"	8.00
Soft White Shavings, Misc.	6.25	"	6.50
No. 1 Fly Leaf Shavings	1.65	"	1.80
No. 2 Fly Leaf Shavings	2.00	"	—
No. 1 Groundwood Fly Leaf Shavings	1.25	"	—
No. 2 Groundwood Fly Leaf Shavings	1.25	"	1.50
Mixed Colored Shavings	2.50	"	2.75
New Manila Envelope Cuts, one cut	5.00	"	5.50
Hard White Envelope Cuts, one cut	3.37½	"	—
Triple Sorted No. 1 Brown Soft Kraft	3.50	"	3.75
Mixed Kraft Env. & Bag Cuttings	3.75	"	4.00
Kraft Envelope Cuttings	3.75	"	4.00
No. 1 Heavy Books & Magazines	2.50	"	2.60
New Manila Envelope Cuts, one cut	2.87½	"	—
New Manila Envelope Cuttings	2.65	"	—
White and Colored Tabulating Cards	4.25	"	4.50
Groundwood Tabulating Cards	1.35	"	—
White Blank News	1.65	"	—
No. 1 Assorted Old Kraft	3.50	"	—
No. 1 Mixed Paper	—	"	.95
Overissue News	1.50	"	1.75
Box Board Cuttings	.72½	"	—
New Corrugated Cuttings, Kraft	2.25	"	—
Old 100% Kraft Corrugated Containers	1.75	"	—
Old Corrugated Containers	1.50	"	—
Jute Corrugated Cuttings	1.07½	"	—
Paper Strings	2.25	"	2.50

Bagging

(F. o. b. Boston)

Gunny Bagging—			
Foreign	—	@	4.75
Domestic	—	"	4.75
Sisal Rope No. 1	6.00	"	—
Sisal Rope No. 2	5.50	"	—
Mixed Rope	5.25	"	—
Mixed Strings	2.00	"	2.50
Transmission Rope—			
Foreign	(nominal)		
Domestic	3.00	"	3.50
Manila Rope—			
Foreign	(nominal)		
Domestic	6.25	"	—
Soft Jute Rope	5.00	"	5.25
Jute Carpet Threads	6.00	"	—
Bleachery Burlap	8.50	"	9.00
Scrap Burlap—			
Foreign	—	"	4.75
Domestic	—	"	4.87½
South America	5.25	"	—
Wool Tares—			
Foreign	4.50	"	—
Domestic	4.50	"	—
Aust. Wool Pouches	5.00	"	5.25
New Zealand Wool Pouches	5.25	"	5.50
New Burlap Cuttings	6.00	"	6.50
Heavy Baling Bagging	5.25	"	5.75
Paper Mill Bagging	3.50	"	3.75
No. 1 Roofing Bagging	1.75	"	—

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints	.08	@	—
Fancy Percales	.07½	"	.08
New White No. 1	.11	"	.11½
New Light Flannelettes	.08	"	.08½
Canton Flannels, Bleached	.10	"	.11
Underwear Cutters, Bleached	.10	"	.11
Underwear Cutters, Unbleached	.11	"	.12
Silesias No. 1	.08	"	.08½
New Black Silesias	.05	"	—
Red Cotton Cuttings	.05	"	—
Blue Overalls	.08½	"	.09
Soft Unbleached	.11	"	.12
Blue Cheviots	.08½	"	.09
Fancy	.06	"	—
Washable	.06	"	
Khaki Cuttings	.06½	"	.07¼
Corduroy	.03½	"	
Khaki Canvas	.06¼	"	.06½
B. V. D. Cuttings	.10½	"	.11½

Domestic Rags (Old)

(F. o. b. Boston)

White No. 1—			
Repacked	3.80	@	—
Miscellaneous	3.20	"	—
White No. 2—			
Miscellaneous	2.65	"	—
Twos and Blues, Repacked	2.20	"	—
Old Blue Overalls	2.25	"	2.50
Thirds and Blues, Repacked	2.20	"	—
Miscellaneous	1.80	"	—
Black Stockings	3.50	"	4.00
Roofing Stock—			
No. 1	2.00	"	—
No. 2	1.90	"	2.00
No. 3	1.35	"	—
No. 4	1.35	"	—
No. 5, Quality A	1.35	"	—
Quality B	1.20	"	—
Quality C	.95	"	—
Old Manila Rope	6.00	"	—

Foreign Rags

(F. o. b. Boston)

Canvas	(nominal)
Dark Cottons	(nominal)
Dutch Blues	(nominal)
New Checks and Blues	(nominal)
Old Fustians	(nominal)
Old Linsey Garments	(nominal)
New Silesias	(nominal)

CHICAGO

Waste Paper

(F. o. b. Chicago)

Mill Prices, Baled

Shavings—			
No. 1 Hard White Envelope Cuts, one cut	$110.00	@	$120.00
No. 1 Hard White Shavings, unruled	105.00	"	115.00
No. 1 Soft White Shavings	80.00	"	95.00
No. 1 White Ledger	55.00	"	65.00
No. 1 Heavy Books & Magazines	40.00	"	43.00
White Blank News	43.00	"	49.00
Mixed Kraft Env. & Bag Cuttings	75.00	"	85.00
No. 1 Assorted Old Kraft	45.00	"	55.00
Overissue News	28.00	"	—
No. 1 News	25.00	"	—
No. 1 Mixed Paper	20.00	"	—
Old Corrugated	36.00	"	—
Mill Wrappers	22.00	"	—

INDUSTRIA, Inc.

52 BROADWAY

NEW YORK

FOREIGN SALES AND SERVICE OF PAPER

AND PULP MILL MACHINERY AND SUPPLIES

Sirrine and Manhattan Win Advertising Prize Awards

FRENCH LICK, Ind.—Results of the National Advertising Agency Network competition disclosed that J. E. Sirrine & Company received a special award of merit for its advertising campaign appearing during 1946 and 1947 in leading general magazines. This marks the sixth consecutive advertising award received by Sirrine. The recent Sirrine series in Fortune was selected by Fortune's editors three times during the past year as being of outstanding merit.

Engineers for 45 years, J. E. Sirrine and Company have built a world-wide reputation as one of the country's leading engineering firms, designing yearly building projects worth many millions of dollars.

Manhattan Rubber Manufacturing Division of Raybestos Manhattan, Inc., received second award for outstanding excellence of its business magazine advertising during 1946 and 1947.

Both campaigns were created and placed through the Roland G. E. Ullman Organization of Philadelphia. The Manhattan campaign appeared in more than fifty leading business and trade magazines. This marks the 14th award received by Manhattan in the fields of advertising, merchandising and public relations.

Matiuk Joins Douglas McBean

ROCHESTER, N. Y.—Alexander Matiuk, formerly power plant project engineer for Ebasco Services, Inc., of New York City, has joined Douglas M. McBean, Consulting Engineer, of Rochester, as power engineer.

International Nickel Distributes Booklet on Alloy Studies

NEW YORK—A compressed handbook and guide "Nickel and High Nickel Alloys" is being distributed by the International Nickel Company. Written by Dr. Norman E. Woldman, consulting metallurgical engineer and former chief metallurgist for Bendix Aviation Corporation, it originally appeared in the technical press and has been made available in convenient reprint form. In addition to information on nickel, Monel, Inconel, and associated alloys it also includes material on such other alloys as the Hastelloys and Illium. Dr. Woldman reports on properties, heat and corrosion resistance, as well as on modern fabrication and finishing practices.

Andre Picard is Decorated

NEW YORK—Andre L. Picard, vice-president of Stein, Hall & Company, Inc., has been decorated by Queen Wilhelmina of the Netherlands with the order of Oranje Nassau for his services during and after the Second World War. Mr. Picard has for many years been a director and vice-president of the Netherlands Chamber of Commerce in New York.

Pennsalt Names Two As Assistant Production Managers

PHILADELPHIA — C. S. Beldin, Production Manager of the Pennsylvania Salt Manufacturing Company, has made known the appointment of Francis E. Murphy and Henry G. Meyer as Assistant Production Managers.

Mr. Murphy was formerly Director of Development at Pennsalt's Whitemarsh Research Laboratories. His new work will cover chiefly the technical aspects of manufacture, Mr. Beldin said. Mr. Meyer was formerly Assistant to the Production Manager. His work, while technical, will be chiefly concerned with the statistical aspects of manufacture.

Mr. Meyer, a graduate of New York University with the degree of Bachelor of Science in Chemistry, joined Pennsalt in 1933. Before coming to the central office he was chemist, chief chemist and then superintendent at the Greenwich plant.

Mr. Murphy attended Villanova College and graduated from St. Joseph's College in Philadelphia with a degree of Bachelor of Science in Chemistry. He joined Pennsalt in 1943 and formerly was with the General Chemical Company and the Golden Gate Bridge and Highway Department. A resident of Florence, N. J., he is a member of the American Chemical Society and American Institute of Chemical Engineers.

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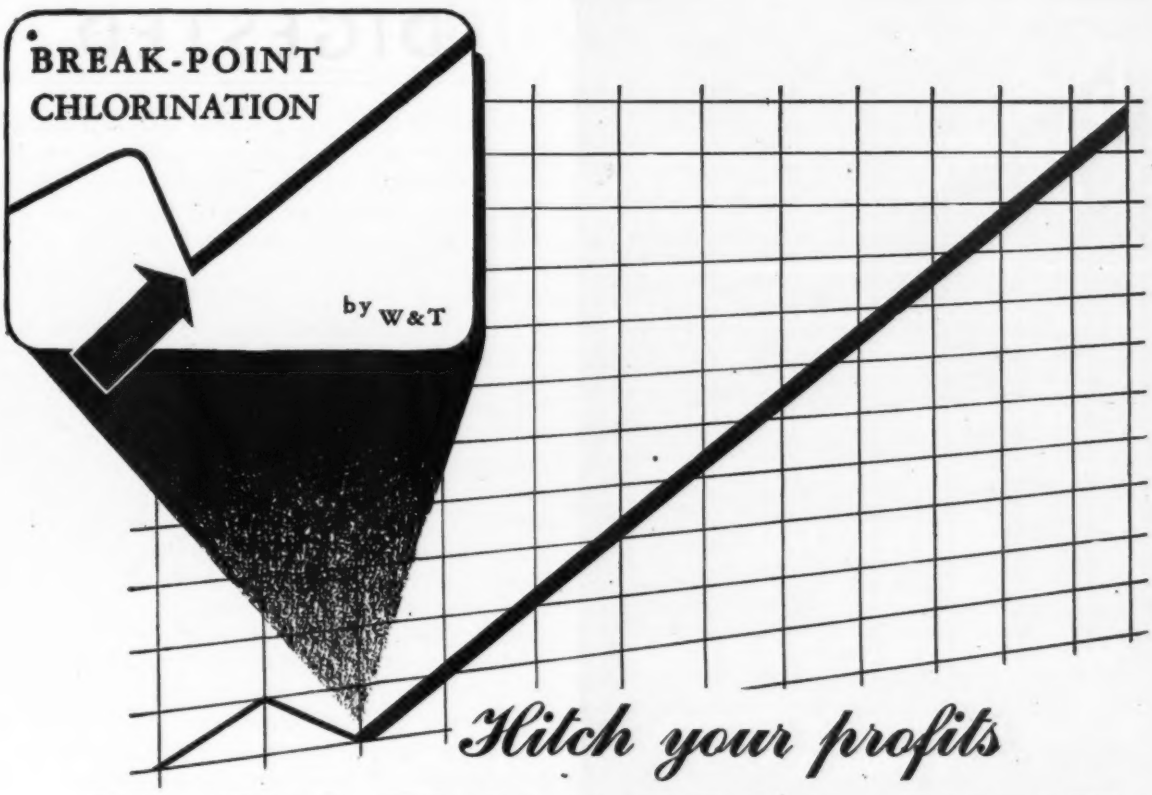

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Slime problems need no longer hold profits down—be a troublesome and costly factor in paper making. The off-quality, breaks, stock losses and other profit-consuming effects of slime can now be controlled or eliminated by Break-Point Chlorination. As the Break-Point curve goes up from the "break-point"—indicating free residual chlorine in the system—so, too, do profits go up when this proved method of slime elimination is used.

With today's increased labor and material costs, these avoidable losses are consuming an ever greater percentage of operating profit. As a result you'll find now more than ever before that the Break-Point Process applied to your fresh water system, together with chloramine treatment and other chemicals for other phases of your system, will give you never-before-possible savings economically—effectively—and simply. You'll find, too, that W & T Chlorination Specialists with over thirty years' experience in water treatment will be glad to make recommendations without obligation and that they are able to draw from a full line of Visible Vacuum Chlorinators—the standard of precision chlorination—exactly the right equipment to fit your particular needs.

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DIGESTED

No law, in itself, will guarantee industrial harmony. Everyone knows that. A fair law such as we now have will provide fertile soil, but industrial peace will flourish only if it is nourished by complete sincerity and goodwill on the part of both management and labor.

When employees desire to bargain collectively, management must do so in complete good faith. It must seek no unintended advantage from technicalities in the new law. And even beyond its legal obligation to bargain, management whole-heartedly must accept properly-run unions as valued and respected agents of its workers in the day-to-day operation of the company.

During the debate on the new law, industrial management was accused frequently by labor leaders of seeking to "bust" the unions. This, repeatedly and emphatically, was denied. Management's sincerity now must be attested, by every word and deed, in its approach to unions under the new law.

If they deem any provision of this bill to be unconstitutional, it is their privilege—their obligation—to contest it in the courts. But only the courts should be used for this purpose. Reservations about the law should not lead to the sabotage of honest collective negotiations at the plant level.—EARL BUNTING, *President, National Association of Manufacturers*

Production Ratio Report*

(Production as per cent of six-day capacity)

COMPARATIVE WEEKLY SUMMARIES

Current Weeks—1947		Corresponding Weeks—1946	
May 17	105.3	May 18	98.3
May 24	105.1	May 25	99.2
May 31	105.6	June 1	96.3
June 7	106.7	June 8	104.0
June 14 (Revised)	107.2	June 15	104.0
June 21	*105.8*	June 22	106.2

COMPARATIVE MONTHLY SUMMARIES

1946						1947	
Jan.	94.7	May	100.7	Oct.	106.4	Jan.	102.1
Feb.	98.4	June	104.6	Nov.	105.5	Feb.	105.9
Mar.	104.4	July	94.0	Dec.	97.0	Mar.	106.1
April	102.7	Aug.	104.7		——	April	105.1
		Sept.	101.3	Year Avg.	101.1	May	*106.2*

COMPARATIVE YEARLY SUMMARIES

	1940	1941	1942	1943	1944	1945	1946	1947
Year to Date	87.0	93.5	99.1	88.8	88.6	88.9	100.4	*105.5*
Year Average	85.6	97.4	90.4	87.8	88.1	89.4	101.1	

PAPERBOARD OPERATING RATIOS†

Current Weeks—1947		Corresponding Weeks—1946	
May 17	102	May 18	92
May 24	101	May 25	93
May 31	98	June 1	85
June 7	98	June 8	96
June 14	103	June 15	98
June 21	*102*	June 22	97

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year Avg.
1946	90	91	100	99	94	97	89	99	96	100	99	92	96
1947	99	103	101	100	*101*								

* Based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

† Per cents of operation based on "Inch-Hours" reported to the National Paperboard Association.

EDITORIAL

Newsprint Prospects

Though it may add nothing to the information already available to those who plan for the future in the newsprint branch of the paper industry, the United States Tariff Commission, in a report which it issued at the end of June made plain the fact that this country must depend heavily on foreign sources for this commodity for many years to come. It declares that rising domestic costs of producing newsprint, the rapidly growing demand for other kinds of paper, and a diminshing supply of suitable pulpwood economically available—all are adverse to any future recovery of the newsprint industry in the United States. In the Northeastern States, effective competition with more modern and more efficient Canadian mills located nearer supplies of pulpwood and operating at somewhat less cost (and during the period 1940-46 having an advantage in exchange) is possible for only one or two of the most efficient United States mills. These particular mills will probably remain in production indefinitely, but others, classed as marginal or high-cost plants, will probably abandon in time the production of newsprint entirely. In the Lake States production of newsprint temporarily ceased in 1946 but will be resumed, in two mills, in 1947. In the Pacific Northwest, where the cost of production is lower than elsewhere in this country, the newsprint mills now operating may continue to produce for a long time; however, little of their product is likely to enter markets east of the Rocky Mountains.

The future of the industry in the South the commission finds is highly conjectural largely because of (1) the rapidly expanding competition among all wood-consuming industries for stands of suitable timber economically located and reasonable in price, (2) the rising cost of labor, (3) the consequent increasing delivered cost of pulpwood, and (4) the ability of Canadian newsprint to compete with southern newsprint in the principal southern centers of consumption, most of which have the advantage of water transportation. The limit of expansion of the industry in the South hence will probably be determined by the region's consumption in the areas inland from the coastal cities, perhaps not more than 150,00 to 200,000 tons a year. Probably not less than 4.4 million tons will be required by the United States in 1947, the commission foresees.

"The total annual capacity of United States newsprint mills in the first quarter of 1947 is estimated to be 850,000 tons, or about 10 per cent greater than the actual output in 1946. The number of mills in operation during the year will probably be 13, of which 5 will be in the Northeast, 2 in the Lake States, 5 in the Pacific Northwest, and 1 in the South. The total capacity of the Canadian mills, as estimated by the Newsprint Association of Canada, will be very nearly 4,350,000 tons.

"Full utilization of the capacity of the Canadian and Newfoundland mills in 1947, if accomplished, will probably tend to increase the total quantity of newsprint produced for world distribution, but how much of this will be available to United States publishers depends largely on existing contracts, commitments within the British Empire, and the presence or absence of transportation and labor difficulties.

"The future relationship of Canada and the United States as principal supplier and principal consumer, respectively, depends to a considerable extent on the long-time policy of the Dominion and Provincial Governments on cutting and use of their timber. There is now evident some concern on their part over depletion of the more readily available stands. Fire, insects, and disease are estimated to be causing annually about one-fourth of the total drain on Canadian forests, and the drain for purposes other than paper making is increasing at a rapid rate. At the same time newspaper circulation in the United States has increased by about 20 per cent since 1939, and all indications are for continued growth. Furthermore, it is expected that some time will elapse before the demand for newspaper advertising space will fall to normal, and until it does so newsprint requirements will continue to grow. Under these circumstances, the possibility of the Canadian mills being able to supply these requirements may be open to question.

"Present indications are that one or more of the Provinces will endeavor to prevent the exportation of wood from Crown lands to any other Provinces or any other country unless it is first fully converted into a finished product or unless a license to export is obtained. While this provision would affect only a minor proportion of the United States imports of paper and paper-making raw materials from Canada, it would tend further to stimulate the expansion of the newsprint industry there."

End in Sight

Assurance that present paper shortages will not long continue were given members of the Toronto Graphic Arts Association last week. Arthur P. Jewett, director of sales of Provincial Paper Limited, said by fall there should be a greater supply of most kinds of paper, particularly coated papers.

The speaker discounted reports of "monkey business" in the paper business. Referring to rumors that Candian needs in paper were being overlooked as exporters played for the higher prices in the United States, Mr. Jewett said: "To the best of my knowledge, nothing of the kind is going on."

W. L. Cook

EDITOR

SAVINGS AND SMILES AT MANY A MILL

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SECTION OF THE

TECHNICAL ASSOCIATION
OF THE PULP AND PAPER INDUSTRY

122 E. 42nd ST., NEW YORK 17, N. Y. Edited By R. G. MACDONALD, Secretary

Developments in Testing of Paper and Paperboard—1945-1946*

By B. W. Scribner[1]

This resumé of general developments in the testing of paper and paperboard is one of the reports on the subject prepared annually by the chairman of the Paper Testing Committee, Technical Association of the Pulp and Paper Industry. Developments related to printability are not included as they are reported by the chairman of the association's Graphic Arts Committee. The numbers in the text refer to the bibliography. The report covers the period November, 1945 to October 1946 inclusive.

Physical Properties, General

According to a TAPPI suggested method, T470 m-45, for edge tearing resistance of paper, a strip of paper is simultaneously torn at opposite points at the edges by means of a thin V-notched beam held in a stirrup which is fastened in one of the clamps of a paper tensile tester *(1)*. The device was developed by Finch. Other new TAPPI suggested methods published are for abrasion resistance of paper and paperboard, T467 sm-46 *(2)* and erasing quality of paper, T478 sm-46 *(3)*. The former is used as a measurement of the suceptibility of paper and paperboard used for packaging to the action of standardized abrasive surfaces. The method is based on the Tabor Abraser. The method for erasing quality employs a controlled abrading apparatus developed by Codwise and La Fontaine. The test is performed on written characters made under exact conditions with standard writing ink. Beach and Falk described an instrument devised for testing the resistance of paperboards, heavy papers, and other similar materials, to puncture *(4)*. The test is a measure of the energy required to force a puncture head of designated size and shape through the material under test. The test has been adopted by A.S.T.M., D-781-44T, and by TAPPI, T803 m-44, for container boards.

Interesting developments occurred in testing related to the flexural properties of paper and boards. A revision of the TAPPI suggested method T469 sm-45 for flexural resistance and deflection of fiberboard was published *(5)*. Changes were made in the specifications for the diameters of the cylinders of the stirrups and in the spans in the flexural loading device. A revision also improved the TAPPI tentative standard T451 m-44 for rigidity and stiffness of paper and paperboards and softness of tissues *(6)*. Eftring described a new method for determining the stiffness of paper and paperboard with an analytical balance *(7)*. The Strachan-Messmer Elastometer and the manner of using it for measurement of resistance to bending, or stiffness of paper and paperboard, were discussed by Strachan *(8)*.

Permeability

Considerable further development occurred in the testing for permeation of fluids, particularly water vapor. Two instrumentation reports of the Institute of Paper Chemistry dealt with the development of nongravimetric methods for water vapor, involving the use of an electric hygrometer *(9, 10)*. In another instrumentation report, a controlled relative humidity cabinet is described in which specimens can be weighed without removing them from the cabinet *(11)*. Carson and Worthington also gave details of a cabinet of this kind, and of accessory equipment used in determination of water vapor permeability *(12)*. Two standard methods of the Packaging Institute for water vapor permeability were published, one for 0°F. *(13)*, and the other for 100°F. *(14)*. The latter is based on the G.F.W.V.T. cabinet. Southwick discussed the need for clarification of the terminology and testing methods for W.V.P. *(15)*.

An ink-line test for determination of the degree of sizing in writing paper was described by Schur and Levy. The method is based upon the measurement of the surface spread of ink lines drawn under closely reproducible conditions by an instrument developed for the purpose *(16)*.

Davis described an isostatic method for measuring the gas permeability of flexible sheet materials used for packaging. The gas to be tested is passed over one side of the test sheets which are held in a diffusion cell and a different "sweep" gas is passed over one side. Both gases are at approximately atmospheric pressure. The sweep gas entrains any test gas which permeates the test sheets and the permeated test gas is determined by chemical means *(17)*.

Chemical

Several articles dealt with testing relating to components of cellulose. Geiger and Kumzler gave a literature survey of the detection of carboxyl and carbonyl groups *(18)*, and Geiger and Wissler de-

* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Hotel Commodore, New York, N. Y., Feb. 24-27, 1947.

[1] Member TAPPI; Chairman, TAPPI Paper Testing Committee; Chief of Paper Section, Natl. Bureau of Standards, Washington, D. C.

scribed a colorimetric method for quantitative determination of carbonyl groups in hydrocelluloses *(19)*. Muller showed experimental evidence that aldehyde groups in oxidized cellulose may be identified by the red color reaction with Schiff's reagent *(20)*. Hiller found potassium permanganate a suitable reagent for estimation of reducing end groups *(21)*. Lea described a rapid method for the determination of beta- and gamma-cellulose, in which separation of them is effected by filtration through Gooch crucibles containing an asbestos fiber mat *(22)*.

The qualitative identification of synthetic resins in paper, by means of stains and tests which give color effects, was discussed by Graff *(23)*. A revision of the TAPPI method for qualitative and quantitative tests for rosin was published *(24)*. The chief purpose of the revision was to point out that the method does not apply to synthetic resins.

Armitage gave a general discussion of the technique of microscopy as applied to fiber analysis and microchemical identification of paper fillers and coating *(25)*. Graff compared the Wilson stain for fiber identification with his C stain and found that they gave practically the same color reactions *(26)*. A stain for differentiating bleached sulphite and bleached sulphate fibers was developed by Stocker and Durant *(27)*. Noll described the use of sulfoxylate-aldehyde compounds for stripping dyes from colored paper for fiber analysis *(28)*.

Testing Related to Specific Products

Several TAPPI methods relating to paper, paperboards and other sheet materials used for packaging were published. A method, T474 sm-46, bending quality of paperboard, distinguishes between bending and nonbending boards relative to suitability for folding boxes *(29)*. The method for moldability of wrapping paper, T466 m-42 was revised. This determines the ability of wrapping papers to retain a crease after being folded *(30)*. Method T477 sm-46 is for testing the blocking resistance of paper and other packaging sheet materials. Blocking is a degree of adhesion between sheet materials that prevents satisfactory performance of them *(31)*. In an investigation made for the development of standards for flexible caselining materials, reported by Scribner, Carson, and Weber *(32)*, the physical tests comprised weight of paper and asphalt per unit area, bursting strength, puncture resistance, tearing resistance, tensile strength, dry and wet, stretch, stiffness, resistance to scuffing, permeation by water and water vapor, and bleeding of asphalt. Correlation of the test data of the sheetings with their performance in simulated service trials showed that the important properties are area, weight of paper and asphalt, wet tensile strength, stretch, and resistance to tearing, puncture and permeation by water vapor and water. Special apparatuses devised for testing for stiffness, scuffing, and water vapor permeability at high temperature and humidity, and for creasing prior to tests for water and water vapor permeability, are described. The procedure used for testing for bleeding of asphalt formed the basis of TAPPI method T475 m-46 *(33)*. In this test, the test specimens are sandwiched between pieces of white paper and the assembly is kept under pressure at 150°F. for a definite period of time, after which the white paper is examined for extent of staining. The TAPPI method, T472 m-46, provides for measurement of the resistance of paperboard to edgewise compression *(34)*.

Babbitt and Hyland reviewed the testing of sheathing papers for evaluation of them, and concluded that the important tests are water resistance and water vapor permeability, and the degree of retention of the quality of the papers in these respects as determined by accelerated aging tests *(35)*.

A suggested TAPPI method, T471 sm-46, contains the testing procedures considered desirable for the evaluation of analytical filter papers. These are based on recommendations of the National Bureau of Standards which developed improved procedures for retentiveness of fine precipitates, flow of water and ash, and a procedure for wet bursting strength. The other tests made by TAPPI methods already available, are for thickness, weight, alpha-cellulose, copper number, and acidity *(36)*.

General

A method for testing fabrics and papers for their attractiveness to silverfish and roaches was proposed by Sweetman, Warner, and Hershberg. Damage to the material under test is measured visually, the percentage of surface injury being determined by means of a glass plate with a ruled cross-sectioned area placed over the test specimen *(37)*. The TAPPI suggested method, T473 sm-46, is for insect resistance of packages, paper, and paperboard. The larvae of cadelle and the adults of the lesser grain borer are used as test insects. The average time required for the insects to penetrate through the sheet material is determined *(38)*.

Scribner gave a resumé of developments in physical testing of paper during 1944-1945 *(39)*, and reported the activities of the TAPPI Paper Testing Committee during 1945 *(40)*. A resumé of the general activities of TAPPI relating to the testing of paper, paperboard and fiber containers is included in the report of the TAPPI Standards Committee for 1945, by the chairman, R. C. Griffin *(41)*.

A list of the methods of the American Society for Testing Materials for testing paper, paperboard, and fiber containers, as of December, 1945, was issued *(42)*. These methods and the TAPPI methods are coordinated by a joint committee.

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A Study of Wet-Strength Mechanism*

The Effect of Melamine Resin on the Bonding of Paper Fibers

By D. J. Salley[1] and A. F. Blockman[1]

Abstract

The effect of melamine resin, used in producing wet-strength paper, on the "ultimate strength" of fibers and on the "adhesion" (or bonding) between fibers in paper has been examined by means of tensile strength tests at both zero and 1-inch spans and by a shear adhesion test. The results indicate that the effect of the resin in increasing the wet strength of paper arises primarily from an increase in adhesion between fibers, the ultimate fiber strength being increased but little. Further, the upper limit to the wet tensile strength of a sheet is fixed by the ultimate strength of the wet sheet and not by the tensile strength of a dry sheet as ordinarily measured. Roughly speaking, the resin appears about equally effective in increasing the adhesion between fibers whether the paper is wet or dry. This suggests that the resin forms bonds of a certain strength between fibers and this strength is not decreased by wetting. Because of the greater opportunity for bonding between fibers as fibrillation of a pulp increases, the resin becomes more effective in increasing adhesion as beating proceeds, at least up to a point.

The melamine resin process for producing wet-strength paper has aroused considerable interest since its development and has been the subject of extensive study *(1, 2)*. As part of the fundamental investigations on the problem of wet-strength paper, it was evidently desirable to learn which of the factors contributing to the strength of a piece of paper are so affected by the treatment with the resin that an increase in the tensile strength of the wet sheet occurs. The purpose of this report is to present data which have been accumulated on this particular aspect of the wet-strength problem. All of the work has been confined to papers treated by the beater process with melamine formaldehyde resin-colloid.

First of all, some ideas regarding the strength of paper must be reviewed. A paper sheet is made up, of course, of many individual fibers of cellulose matted together. When the sheet is formed, these are laid down in such a way that the great majority lie with their long axis parallel to the plane of the sheet but at various angles in the plane. The strength of a dry sheet of paper is brought about by a combination of many factors which come into play as the result of this arrangement *(3, 4)*. It is apparently not possible to define these clearly nor to separate them sharply, and consequently a quantitative determination of the amount which each contributes to the total strength of the sheet cannot be made. For the present purposes, however, it appears permissible *(3, 5)* to separate the factors into two main groups concerned with (a) the ultimate strength of the fibers, and (b) the bonding between fibers.

It is easy to picture these two divisions in a qualitative way. Clearly, the absolute or ultimate strength of the individual fibers sets the upper limit to the strength of a sheet, for a strong sheet cannot be obtained unless the fibers themselves are strong. *(4)*. The bonding between fibers is more difficult to comprehend for it is a complex function which may consist of many factors. The overall adhesion supposedly results partly from bonds between neighboring fibers and partly from friction due to entanglement, intertwining, and surface roughness of the fibers *(3)*. As regards the bonds, it is in no way necessary for the purpose of this report that their exact nature be specified, but they may be regarded as secondary valence forces between hydroxyl groups. *(3)*. The frictional effects, generally speaking, are not large compared to the bond forces *(3)*. The overall resultant of the two depends on such factors as length, diameter, and flexibility of the fibers, the area at the places of contact, the orientation of the fibers *(3, 4)*, etc., and evidently the separation and evalution of all of these would be an almost impossible task. Consequently, all of the properties concerned with the fiber-to-fiber bonding have here been lumped into one without closer definition and designated by the general term "adhesion". In attempting to estimate what properties of the paper are affected by the resin, the ultimate strength and the adhesion are therefore the two which will be examined. (The terms "adhesion", "bonding between fibers", and "fiber-to-fiber bonding" are used interchangeably.)

A good relative measure of the ultimate strength of the fibers can be obtained by the so-called zero span test *(6, 7, 8)*. In this the jaws of the tensile tester are brought together until they touch so that the span of the paper specimen is "zero". Under such conditions, supposedly both ends of all the fibers are caught in the jaws of the clamp. Every fiber ought to be broken when the breaking load is reached and hence the statistical average strength of all the fibers should be obtained. In practice, slipping, tearing, and cutting takes place and consequently the absolute value of the fiber strength is not attained. On a relative basis, however, zero span values may be used for "ultimate strengths", and in this report the two terms will be used interchangeably.

An estimate of the overall property called adhesion can be obtained by comparing the zero span test with the ordinary test made at a span length of 1 inch or greater *(6, 4)*. With such a large span, obviously only one end of any fiber can be caught in the clamp jaws, so that andy fiber-to-fiber bonding is brought into play as the load is applied. Theoretically the maximum strength of a sheet of paper will be reached when the adhesion between the fibers is as large as (or greater than) the ultimate strength of the fibers, for then the full strength of the fibers themselves becomes effective. In pulling a sheet of paper where such a condition exists, none of the fibers should slip past each other but all should break, and as a result the breaking load at 1-inch span should be the same as at zero span. On the other hand, if the adhesive forces are not as great as the ultimate strength, the

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[1] Stamford Research Laboratories, American Cyanamid Co., Stamford, Conn.

breaking load at the long span should be less than at zero span. With such a picture as a basis, a quantity called "per cent adhesion" has been defined *(6,4):*

$$\% \text{ adhesion} = \frac{\text{tensile strength at long span}}{\text{tensile strength at zero span}} \times 100 = \frac{t_1}{t_0} \times 100 \qquad (1)$$

By measuring the tensile strength of a piece of paper at zero span and at large span, therefore, an idea of both the ultimate strength of the paper and of the fiber-to-fiber bonding may be obtained. Admittedly, these tests are not very good when comparison is made from pulp to pulp where fiber length, diameter, degree of heating, etc., may change. In evaluating the effect of resin on a given pulp, however, such changes in the fibers are not involved, and therefore these tests may serve very well in a comparative way.

A second test, called the "shear adhesion test", has recently been developed by Clark for measuring fiber-to-fiber bonding *(4)*. For this a double sheet of paper is first made by pressing and drying two ordinary sheets together. Strips are cut from the double sheet and the two layers carefully pulled apart, working from each end toward the center. A middle section is left adhering so that the specimen has an X shape. The diagonally opposite ends of the specimen are clamped in the jaws of a tester and the sheets pulled apart by a direct shear. This test has the advantages that the fibers supposedly do not become entangled and also that the ultimate strength does not enter into any calculation. In order to have an independent method of evaluating the effect of resin on adhesion, therefore, in some experiments this test was carried out along with the zero span and per cent adhesion measurements.

Experimental

ZERO AND 1-INCH SPAN:

The zero span and the 1-inch tensile tests were made with a Scott I.P. No. 3 tensile tester. For the measurements at zero span, the jaws of the tensile tester were fitted with blocks of steel machined flat, and the paper specimen was clamped between these. Strips ½ inch wide were used and five to ten specimens were broken for each test; the deviation of values from the average was about ± 10%, somewhat larger than that for the ordinary tensile tests (±5%). The dry sheets were conditioned at 73°F. and 50% relative humidity, while for the tests on the wet papers the specimens were soaked at least 1 hour before use.

TABLE I.—ULTIMATE STRENGTH, PER CENT ADHESION, AND SHEAR ADHESION DATA

Paper No.	Resin in Paper %	Tensile, lb./in. Dry t_0	Dry t_1	Wet t_0	Wet t_1	% Adhesion[a] Dry	Wet	Shear Adhesion, Shear, lb./0.125 in.² Dry S	Wet S
a	b	c	d	e	f	g	h	i	j
				Bleached kraft pulp					
1	0.0	30.0	24.4	17.4	2.0	81	11	8.7	0.4
2	2.0	29.0	27.0	17.0	8.2	93	48	10.2	1.6
				Bleached kraft pulp					
3	0.0	30.2	24.6	17.6	0.7	81	4	8.1	0.14[b]
4	0.7	31.6	27.0	16.6	3.0	86	18	8.3	0.6
5	2.5	29.2	30.2	20.0	5.6	103	28	9.5	1.0
6	3.5	30.8	26.2	20.0	8.0	85	40	10.9	2.0
				Unrefined pulp					
7	0.0	27.8	12.4	17.8	0.5	44	2.8	...	...
8	0.7	27.2	14.4	18.2	1.8	55	10	...	...
9	2.0	26.6	16.8	18.6	3.8	63	22	...	...
10	2.4	27.2	14.4	16.6	4.0	55	24	...	...
				Moderately refined pulp					
11	0.0	32.4	24.2	17.6	0.8	75	4.6	...	...
12	0.8	30.4	27.2	19.6	3.0	89	15	...	...
13	2.4	32.0	26.8	18.2	5.2	83	29	...	...
14	3.8	35.2	26.2	21.6	8.2	74	38	...	...
				Well refined pulp					
15	0.0	33.2	25.8	12.8	1.6	78	12.5	...	...
16	0.9	30.8	25.4	14.0	3.5	82	25	...	...
17	2.5	32.2	29.2	15.4	6.8	91	44	...	...
18	6.9	33.0	30.0	17.0	11.2	91	66	...	...
				Alpha pulp					
19	0.0	19.2	11.4	11.2	0.8	59	7	...	...
20	0.8	22.2	16.0	13.8	3.8	72	28	...	...
21	1.3	23.6	19.2	13.6	6.0	81	44	...	...
22	2.2	21.0	18.2	13.2	7.0	87	53	...	...
23	6.2	21.2	16.4	11.4	8.0	78	70	...	...
				100% soft alpha pulp					
24	0.0	32.4	29.6	21.2	1.0	91	5	...	...
25	2.4	41.6	41.6	28.8	16.8	100	58	...	...
				Kraft-sulphite pulp					
26	0.0	30.2	19.0	18.2	2.0	64	11	...	...
27	1.5	29.2	26.4	20.2	9.0	90	45	...	...

[a] $\frac{t_1}{t_0} \times 100 = \%$ adhesion.

[b] Approximate value (less than 0.2, greater than 0.1).

SHEAR ADHESION:

The shear adhesion tests were made with the Schopper tensile testing machine. The double sheets were prepared by taking handsheets as they came from the deckle, superimposing one on the other, moist pressing 5 minutes at 50 pounds pressure, then 2 minutes at 50 pounds (changing blotters), then drying at 105°C. for 2 minutes on a rotary drum drier. Specimens ½ inch wide were used and a ¼ inch middle portion was left adhering so that the contact area was 0.125 square inches. From five to ten strips were sheared for each test; the agreement between specimens was quite good, about ±5%, at least equal on the whole to that usual for measurements of tensile strength. The specimens were conditioned as described above.

Results

CHANGE OF TENSILE STRENGTH WITH SPAN:

In order to have experimental evidence of the change in tensile strength with the distance between clamps, a number of tests were carried out at different spans on an untreated and on a treated sheet of mill-made kraft-sulphite paper. The results for both the dry and wet sheet are shown in Fig. 1 in which tensile is plotted against span. For both cases the figure indicates that the tensile strength is practically constant at span lengths greater than 0.25 inches. On the basis of these experiments, measurements were made only at zero and 1-inch spans in subsequent work.

EFFECT OF RESIN ON THE ULTIMATE STRENGTH, PER CENT ADHESION AND SHEAR ADHESION:

The experimental data on zero span, per cent adhesion, and shear adhesion tests for eight sets of papers containing varying amounts of resin are collected in Table I. The paper comprised (a) handsheets of a bleached Southern kraft pulp; (b) another set of handsheets of the same type of pulp; (c) three series of handsheets made from a bleached Southern kraft refined to different degrees; these were designated as unrefined, moderately refined, and well refined and had Green freeness values of 635, 473, and 82 ml. respectively; (d) handsheets made from alpha pulp; (e) a machine-made bond type paper of 100% soft alpha pulp beaten 8 hours; and (f) a machine-made butterwrap paper of 75% bleached kraft—25% bleached sulphite pulp. The basis weight of all handsheets was about 50 pounds, the bond type papers about 62 pounds, and the kraft-sulphite butterwrap about 33 pounds, all on 25 by 40—500 basis. In Table I, t_0 and t_1 are the tensile strengths in pounds per inch at zero and at 1-inch span, respectively; per cent adhesion is calculated by equation (1); and S is the shear adhesion in pounds /0.125 square inch.

Since the primary purpose here is to learn the effect of resin on the ultimate strength and on the adhesion, a comparison of the treated with the untreated papers within a given set of sheets is desired.

TABLE II.—EFFECT OF RESIN ON ULTIMATE STRENGTH AND ADHESION

		Dry			Wet		
		Ratio of:			Ratio of:		
Paper No.	Resin in paper, %	Ultimate Strength, $\frac{(t_0)_{tr}}{(t_0)_{un}}$	% Adhesion $\frac{\left(\frac{t_1}{t_0}\right)_{tr}}{\left(\frac{t_1}{t_0}\right)_{un}}$	Shear Adhesion, $\frac{(S)_{tr}}{(S)_{un}}$	Ultimate Strength, $\frac{(t_0)_{tr}}{(t_0)_{un}}$	% Adhesion $\frac{\left(\frac{t_1}{t_0}\right)_{tr}}{\left(\frac{t_1}{t_0}\right)_{un}}$	Shear, $\frac{(S)_{tr}}{(S)_{un}}$
a	b	c	d	e	f	g	h
1	0.0	1.0	1.0	1.0	1.0	1.0	1.0
2	2.0	0.97	1.15	1.05	1.10	4.3	4.0
3	0.0	1.0	1.0	1.0	1.0	1.0	1.0
4	0.7	1.05	1.06	1.03	0.94	4.5	4.3
5	2.5	0.97	1.27	1.17	1.13	7.0	7.2
6	3.5	1.02	1.05	1.35	1.13	10.0	14.3
7	0.0	1.0	1.0	...	1.0	1.0	...
8	0.7	0.98	1.20	...	1.02	3.6	...
9	2.0	0.96	1.43	...	1.05	7.9	...
10	2.4	0.98	1.25	...	0.94	8.6	...
11	0.0	1.0	1.0	...	1.0	1.0	...
12	0.8	0.94	1.19	...	1.11	3.3	...
13	2.4	0.99	1.11	...	1.03	6.3	...
14	3.8	1.08	1.0	...	1.23	8.3	...
15	0.0	1.0	1.0	...	1.0	1.0	...
16	0.9	0.93	1.05	...	1.09	2.5	...
17	2.5	0.97	1.17	...	1.20	3.5	...
18	6.9	1.00	1.17	...	1.33	5.3	...
19	0.0	1.0	1.0	...	1.0	1.0	...
20	0.8	1.15	1.22	...	1.23	4.0	...
21	1.3	1.23	1.37	...	1.21	6.3	...
22	2.2	1.10	1.47	...	1.18	7.4	...
23	6.2	1.10	1.32	...	1.02	10.0	...
24	0.0	1.0	1.0	...	1.0	1.0	...
25	2.4	1.28	1.1	...	1.36	12.0	...
26	0.0	1.0	1.0	...	1.0	1.0	...
27	1.5	0.97	1.4	...	1.12	4.1	...

Note: tr = treated paper. un = untreated paper.

To facilitate this comparison, the ratio of the treated to the untreated has been calculated for each set of sheets by simply dividing the value for the treated by that for the untreated paper. The resulting figures are shown in Table II, where they have been grouped according to "dry" and "wet".

Considering first the data for the dry papers, the comparison shows that on the whole the ultimate strength was changed but little if any by the resin treatment. On the other hand, the per cent adhesion figures increased 1.05 to 1.47 times. Shear adhesion results also increased, and reasonable concordance existed between the two tests.

In the case of wet papers, resin treatment apparently caused comparatively small relative increases in the zero span values, amounting to 36% at the most. In contrast to this, the per cent adhesion and shear adhesion tests both showed increases in adhesion up to 12 fold with resin treatment. Furthermore, the correspondence between the figures for the two tests was good over the whole range (cf. columns g and h), especially so in view of the very different nature of the tests. This shows that for present purposes the rather indirect per cent adhesion test is a satisfactory way of estimating change in adhesion between fibers.

From the foregoing the conclusion may be drawn that the effect of the resin in increasing the wet strength of paper is due primarily to an increase in fiber-to-fiber bonding. This is the most important generalization to be obtained from the present data. A more detailed examination of various points is taken up in the following discussion.

Discussion

Ultimate Dry Strength:

As previously mentioned, the measured zero span strength of the dry sheets did not change with the resin content of the paper. A close study of all the data shows that this is true within ±10%, with the exception of some of the alpha-cellulose handsheets and of the bond type paper. These show increases up to about 30%, but whether these exceptions indicate real increases in the ultimate strength is not possible to decide from the present experiments. As pointed out in the description of the zero span test, the tearing, cutting, and slipping which occurs does not permit a true measurement of the ultimate strength*, and furthermore the values obtained are influenced more or less by the adhesion. These considerations make it difficult to judge whether changes in the ultimate strength have actually taken place on treatment with the resin. It is possible that the exceptions noted are real, and that some differences would be discovered also for the other papers were it not for these difficulties and for the rather large experimental deviation of the test results.

Ultimate Wet Strength:

At the outset of this investigation, it was thought possible that the ultimate strength of the wet fibers might be so low that the zero span and 1-inch span values for the wet sheets might be identical. Had this been the case, the resin would have had to increase the ultimate strength as well as the fiber-to-fiber bonding in order to increase the wet strength. Actually, a study of the data of Table I for all the papers tested shows that the zero span strength of the wet sheets was always high, and in no instance did the treatment with resin succeed in bringing the 1-inch span value up to the zero span figure for the untreated sheets. This observation indicates that to make most efficient use of the resin, the aim at present should be to increase not the ultimate wet fiber strength but only the adhesion. If eventually this latter is successfully brought to a value greater than

* J. d'A. Clark has suggested (private communication) that the zero span figures reported here may be low by a factor of 2.

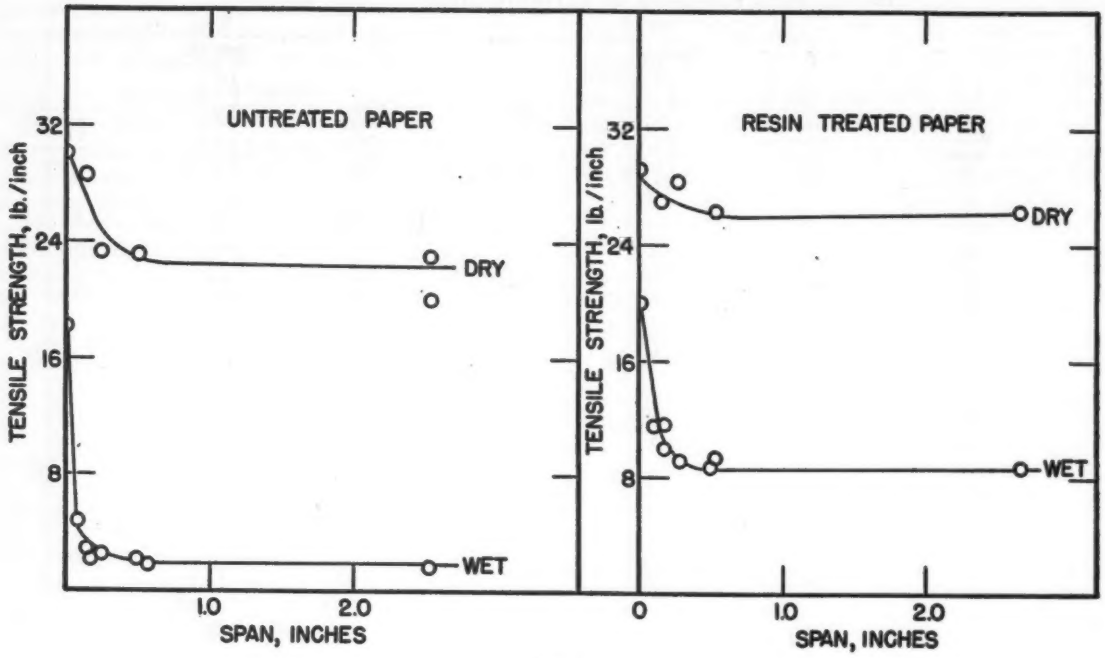

FIG. 1
Decrease of Tensile Strengths with Span for Untreated and Resin-Treated Papers.

the ultimate strength of the wet, untreated sheets, then a higher wet ultimate strength in the treated papers would be useful. At present, any increases in ultimate wet fiber strength are of no value.

In regard to possible increases in the ultimate strength of the wet sheets on resin treatment, Table II shows that with only two exceptions the zero span values of the various papers increased from 2% to a maximum of 35%. Generally speaking, the results in any given series scatter so that no regular trend with resin content can be found. The remarks made above regarding the inability of the zero span tests to give a true ultimate strength apply here also, so that it is difficult to obtain a correct answer from the present data. However, it appears probable that the increase in zero span figures for the wet, treated sheets really mean that the ultimate wet strength of the fiber is somewhat greater. As will be discussed in more detail below, this can be brought in line with the observed increase in fiber-to-fiber bonding.

It has often been the practice to evaluate the wet strength of a paper in terms of its dry strength. Since the upper limit to which the resin might raise the ordinary wet strength is given by the ultimate strength of the wet fibers, the dry tensile strength as measured at 1-inch or at zero span may have little or no relation to it. It is to be noted that the zero span values for the wet sheets in the present papers run about 40 to 65% of those for the dry sheets. Such lower values seem probable, as considerations of cellulose structure suggest that the wet fiber should be weaker than the dry *(9)*. Assuming this to be at least qualitatively correct, then the wet strength of the sheet cannot be expected to reach the ulimate dry strength. Neither can the wet strength possibly attain the ordinary dry strength unless the ultimate strength of the wet fibers happens by coincidence to be as high as the ordinary dry tensile. Obviously this will depend on the type of paper and may vary from furnish to furnish. For example, an examination of the data for the present papers shows that only in the case of the unrefined pulp was the zero span test for the wet fibers higher than the ordinary dry tensile, although in a few other instances the two were nearly equal. In these papers, therefore, the resin could theoretically have brought the wet strength equal to or greater than the dry tensile of the untreated sheet. In any event, it is to be emphasized that in order to estimate how closely the wet strength has approached the theoretical maximum, a measurement of the ultimate wet fiber strength is required.

ADHESION IN THE WET AND DRY PAPER:

During the presentation of the data in Tables I and II the point was made that apparently the adhesion of the dry sheets was increased much less by treatment with resin than was that of the wet paper. Most of the dry untreated papers had over 50% adhesion, and on treatment the maximum effect obtained was 1.47 fold. On the other hand, the wet untreated papers showed less than 12% adhesion and increases of 2 to 10 fold were common after treatment. In reality, a direct comparison of the relative increases between wet and dry sheets in this manner is misleading, as appears from the following simple considerations. It would seem logical to expect that the resin would produce a more or less constant increase in fiber-to-fiber bonding which would not be affected by wetting. Thus, in discussing the general concept of adhesion in the introduction, mention was made of the fact that bonding between paper fibers is probably due very largely to secondary valencies between hydroxyl groups and in some measure to frictional forces. Formally, this might be expressed:

$$A_{un} = A_{OH\text{-}HO} + A_{friction} \qquad (2)$$

Upon treatment with resin a third factor may be added:

$$A_{tr} = A_{OH\text{-}HO} + A_{friction} + A_{resin} \qquad (3)$$

When the adhesion of the treated and untreated papers is compared:

$$\frac{A_{tr}}{A_{un}} = \frac{A_{OH-HO} + A_{friction} + A_{resin}}{A_{OH-HO} + A_{friction}} \qquad (4)$$

These equations should apply to both the wet and dry papers. When dry, $A_{OH-HO} + A_{friction}$ is larger than A_{resin}, so that values of the ratio lie between 1 and 2. When the paper is wet, the water "dissolves" the secondary valence bonds, and likewise reduces the friction, so that $A_{OH-HO} + A_{friction}$ becomes smaller than A_{resin} which supposedly has been unaffected by the wetting; consequently large values of the ratio may result. As a numerical illustration typical of the observations, the following figures in arbitrary units might be assumed:

$$A_{OH-HO\ (dry)} = 20;\ (wet) = 1$$

$$A_{friction\ (dry)} = 2;\ (wet) = 0.2$$

$$A_{resin} = 5$$

$$\left(\frac{A_{tr}}{A_{un}}\right)_{dry} = \frac{20 + 2 + 5}{20 + 2} = 1.23$$

$$\left(\frac{A_{tr}}{A_{un}}\right)_{wet} \quad \frac{1 + 0.2 + 5}{1 + 0.2} = 5.1$$

The possibility that the resin adds to the adhesion between the fibers by a bonding process which is not affected by wetting the paper may be tested by directly comparing the increase in tensile strength at one inch span for the wet and for the dry papers. This increase is, of course, merely the difference between the values for the treated and untreated sheets. Such a comparison is shown graphically in Fig. 2 where the increase for the dry papers is plotted against the increase for the wet sheets for all the papers tested. Obviously, if the increases in tensile strength for the wet and the dry sheets were always identical, all of the points would lie on the 45° straight line. The graph shows that the data scatter very considerably; however, the trend seems to be along the expected line and there are about as many points above as below it. Furthermore, large deviations are not too surprising here since the error attached to these differences is very considerable. The X points on the graph designate the increases observed in the shear adhesion test, and they also indicate the same general trend. Consequently, at present it appears that the resin is causing about the same increase in tensile strength in both the wet and dry sheets, suggesting that the increase in fiber-to-fiber bonding is constant, unaffected by wetting, in accordance with the formulation of the preceding paragraph. Clearly, however, additional data from carefully controlled tests are required to establish firmly this conclusion.

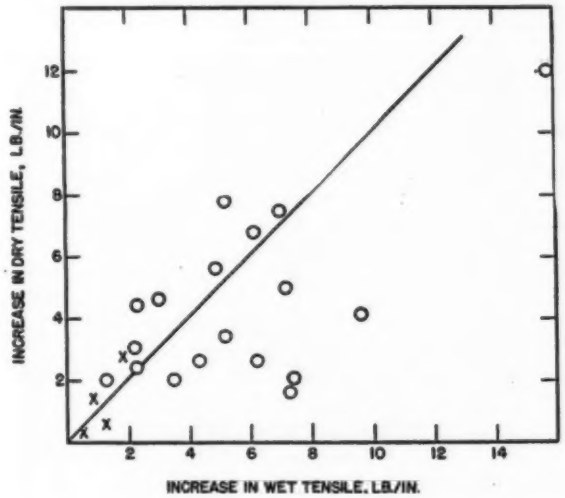

FIG. 2
Comparison of Increase in Tensile Strength for Wet and Dry Sheets. O, 1-inch span tests. X, shear adhesion tests.

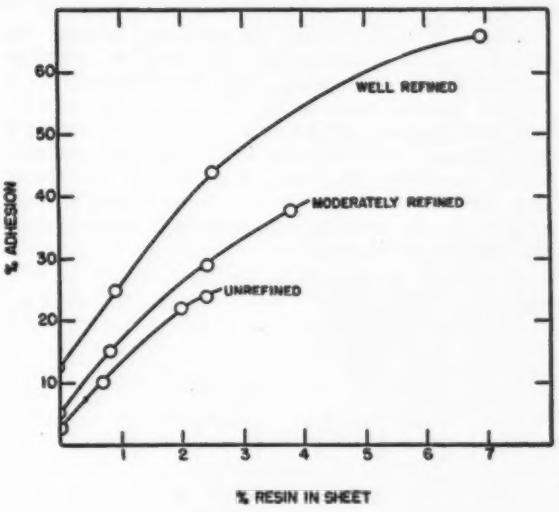

FIG. 3
Increase in Resin Bonding with Refining and with Resin Content.

As observations incidental to the shear adhesion work, it was noted that no adhesion was obtained if the sheets were pressed together but not dried and cured. Likewise, no adhesion was obtained if two single sheets were first dried and cured, then re-wet, pressed, and dried together in the usual manner. These facts show that bonding is only realized on curing, suggesting possibly that the bonds are chemical in nature.

INCREASE IN RESIN BONDING WITH BEATING:

The fact that adhesion between fibers is increased by treatment of the pulp with resin should apparently have several consequences. For example, in a well-beaten pulp where fibrillation has proceeded to a considerarble degree, there should be a greater chance for the resin to increase the bonding than in an unbeaten stock where little or no fibrillation exists. Other things being equal, the resin might therefore be more effective in the former case. An opportunity for checking this supposition is afforded by papers 7 to 18 which were made from unrefined, moderately refined, and well-refined pulps. Figure 3 shows a plot of the per cent adhesion against the per cent resin in the sheet for these three sets of papers. The curves illustrate the fact that the adhesion is nearly directly proportional to the amount of resin in the sheet up to 2% resin content but falls off at higher concentrations. Furthermore, the slopes of the curves increase somewhat on passing from the unrefined to the well refined pulp, suggesting that the resin has indeed been relatively more effective in increasing the per cent adhesion after refining of the pulp has proceeded. The fact that the curves do not start at the same per cent adhesion is, of course, due to the increased bonding which results from the refining.

Obviously the idea that refining and increased efficiency of the resin should run more or less parallel

cannot be pushed too far. On excessive beating, the fibers are so broken down that the resulting sheet has little of the usual structure, and the concept of fiber-to-fiber bonding more or less disappears. Increase in per cent adhesion and hence in ordinary wet strength on treatment with the resin should then be comparatively small. On this basis, therefore, it is probable that the increase in per cent adhesion resulting from treatment with resin may go through a maximum as the refining of the pulp is increased.

Returning now to the zero span results on wet sheets, it appears that some increase in ultimate strength would be in accord with the observation that the resin increases bonding between fibers. Thus, the fibers themselves are made up of fibrils and if resin penetrates to a certain extent between them and forms bonds, then the ultimate strength of the wet fiber could show an increase. Furthermore, where fibrillation has proceeded to a large degree, the ultimate wet strength of the untreated fibers might decrease with beating but penetration by resin might be greater and therefore cause a more marked increase of this ultimate tensile. This appears to be the case for the three pulps (papers 7 to 18) having different degrees of beating, for the zero span wet strength of the well-refined untreated sheet is the lowest, but the increase in strength with resin is the greatest. The effect is also noticeable for the well beaten bond type stock, where a 36% increase occurred with 2.4% resin in the sheet. On the above view the zero span dry tensile ought also to change upon treatment with resin and should be more pronounced with a well-beaten stock. The only evidence of this effect is with the bond type paper, for this shows a large increase in zero span dry strength, and at the same time 100% adhesion is attained. Very likely these effects are related to the high degree of fibrillation of this stock.

The application of these comparatively simple physical tests has demonstrated in a general way that the resin primarily accomplishes its results by increasing fiber-to-fiber bonding in paper. As regards details, however, the foregoing discussion has indicated that the data of this report are by no means adequate, especially as regards the ultimate strengths. It would appear desirable to investigate in a more fundamental and quantitative way the relative changes in ultimate fiber strength and fiber bonding and the effect of various external factors on these. Such information should aid in obtaining the maximum efficient use of the resin, and further should be helpful in investigations designed to learn the exact nature of the bonds involved.

From a more practical side, it is believed that paper mills might profitably apply the method of approach used here to some of their own current problems. It should be a worth while matter to determine the maximum wet strength that may be expected with specific furnishes. At the present time, for instance, when many mills are attempting to extend long fibered pulps with shorter fibered stocks, a study along the lines used here should aid in making an intelligent decision regarding the value of resin additives for increasing both the wet and dry strength of the finished papers.

The authors wish to acknowledge the assistance and contributions to this work of their co-workers of the Physics Division and of the members of the Paper Chemicals section of these Laboratories.

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New TAPPI Members

The Executive Committee of the Technical Association of the Pulp and Paper Industry has elected the following to membership:

Andre Beylier, Ingenieur, Ateliers Neyret Beylier, Grenoble (Isere) France, a 1929 graduate of Ecole Francaise de Papeterie.

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William M. Cary, Production Manager, National Container Corp., Jacksonville, Florida.

Alex W. Hart, Chief Chemist, Anchor Hocking Glass Corp., Lancaster, Ohio, a 1940 graduate of Allegheny College.

Ernest J. Kirkup, Manager and Director, Donside Paper Co., Ltd., Woodside, Aberdeen, Scotland.

Frederick J. Schott, Chemical Engineer, The Mead Corp., Chillicothe, Ohio, a 1942 graduate of Pennsylvania State College.

Georges Marsan, President du Conseil d'Administration, Societe JOB, Toulouse, (Haute Garonne) France, a 1926 graduate of Ancien Eleve de L'Ecole des Sciences Politiques (Paris).

Dinesh C. Tapadar, Chief Chemist, India Paper Pulp Co., Ltd., Calcutta, India, a 1935 graduate of Calcutta University, with an M. Sc. degree in 1937.

Otha Winningham, Assistant Chief Engineer, National Container Corp., Jacksonville, Florida, a 1929 graduate of Mississippi State College.

T. Cathinco Bang Student, A/S Tofte Cellulosefabrik, Oslo, Norway. Mr. Bang is visiting mills in this country.

Oscar C. Cordes, Assistant Sales Manager, Downingtown Mfg. Co., Downingtown, Pennsylvania, a 1918 graduate of Cooper Union.

James C. Lowe, Sales Engineer, Oliver United Filters, Inc., Chicago, Illinois.

Roland H. Sharpe, Assistant to Managing Director, Backhouse & Coppock Ltd. He attended Shrewsbury House Preparatory and Stowe School.

Maurice H. Vaughan, Chemical Engineer, Solvay Process Co., Syracuse, New York, a 1933 graduate of Virginia Military Institute.

Edward C. Willcox, Mill Analyst, Pacific Mills, Ltd., Ocean Falls, B. C., Canada, a 1946 honor graduate of the University of British Columbia.

William A. White, Jr., Assistant Chief Engineer, Shartle Brothers Machine Co., Middletown, Ohio. Attended the University of Kentucky.

Clarke M. Williams, Chemical Engineer, Rayonier, Inc., Olympia, Washington, a 1932 graduate of the University of Washington.

Wilfred M. Wyburn, Engineer, Federal Paper Board Co., Inc., Bogota, New Jersey, a 1924 graduate of Stevens Institute of Technology.

Heat Balance and the Paper Machine Drive*

By R. R. Baker[1]

Abstract

Two important costs must be taken into consideration in the operation of the paper machine: first, the power costs for driving the machine, and second, the steam costs for drying the paper produced on the machine. In the modern mill high pressure and temperature steam generation has made it possible to generate a large part of the plant power requirements as a byproduct of the process steam requirements by the use of bleeder type turbine units.

Essentially the power requirements vary directly as the operating speed of the paper machine, whereas the drying steam requirements remain constant within reasonable limits. If a balance is maintained between the power and process steam requirements of the paper machine at high speed, an excess of power will be generated from the same quantity of process steam at the low speed provided high conversion efficiency is maintained over the operating speed range.

There are three general types of drive applied to the modern paper machines including sectional electric, single motor mechanical, and turbine mechanical. The operating efficiency of each type is discussed with reference to the overall heat balance of the plant.

There are two important costs which must be taken into consideration in the operation of the paper machine. One, the cost of power for driving the machine, and the other, the cost of steam for drying the paper produced on the machine. It has been estimated, in mills producing both chemical pulp and paper, that the power and steam costs make up between 10 and 20% of the cost of the final product. It should be noted that although the driving of the paper machine requires only a small part of the total plant power requirements, the process steam required for paper drying represents a very large part of the total process steam requirements. For example, in a mill operating a high speed fourdrinier machine and producing both kraft pulp and paper, the power requirements for driving the machine might represent only 5 to 10% of the total plant load, whereas the process steam required might make up some 30% of the total process steam load.

* Presented at the Annual Meeting of the Technical Association of the Pulp & Paper Industry, Hotel Commodore, New York, N. Y., Feb. 24-27, 1947.

[1] Member TAPPI; Westinghouse Electric Corp., East Pittsburgh, Pa.

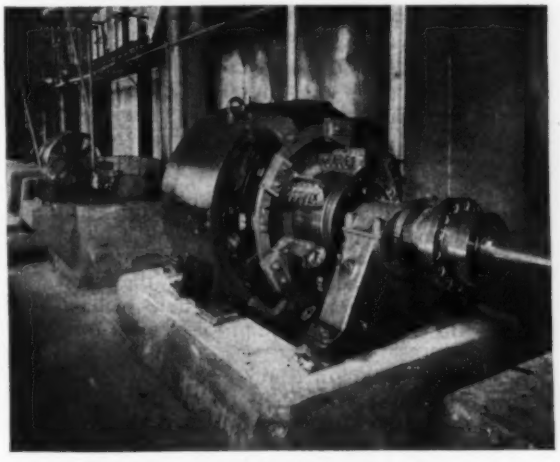

FIG. 1

1750 Adjustable Speed Geared Turbine for Paper Machine Line Shaft Drive—10/1 Operating Speed Range—145 p.s.i.g.—75° FTT Throttle 40 p.s.i.g. Exhaust

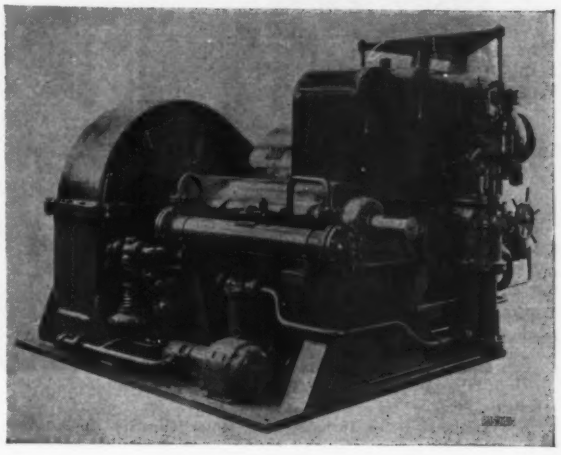

FIG. 2

250—48 to 480 motor direct connected to Paper Machine Line Shaft

Through the proper selection of prime-movers as well as steam pressures and temperatures, it is possible to obtain a substantial part of the plant power requirements as a byproduct of the drying steam. In selecting a suitable drive for the paper machine, either when a new drive is being installed or when an old drive is being revamped, the question of heat balance should receive serious consideration. Although many mills have taken full advantage of these possibilities, there are still many mills throughout the country which are unable to obtain their entire plant power requirements as a byproduct of the process steam, and which are therefore required to operate condensing units to obtain sufficient power for their operations. The condenser heat losses in such plants result in over-all higher power costs. In mills operating under these conditions it is essential that power losses be eliminated wherever possible and that the maximum byproduct power be obtained from every pound of process steam required. It is a fallacy in connection with a paper machine drive to assume that inefficient operation can be justified merely because it is possible to generate sufficient power to drive the paper machine as a byproduct of the process steam required in drying.

In considering a heat balance in connection with the paper machine drive, it is necessary to bear in mind that although essentially the power requirements vary directly with the operating speed of the machine, the machine production rate and consequently the drying steam requirements remain constant over the speed range. The maximum operating speed and the speed range required of the drive depends upon the grade of paper and the range of paper weights to be

FIG. 3
Sectional Drive Including 900 Motor Capacity Applied to Individual Sections of Wide High Speed Fourdrinier Machine Requiring 8.5 to 1 Operating Speed Range

produced. These requirements vary with the particular machine under consideration. For example, the operating range required on a news machine is somewhat less than 2 to 1, whereas the range required on a kraft or on certain specialty machines may be 10 to 1 or more.

Types of Drives

There are three types of drives which should be considered for the new or for the revamped paper machine. These include: (1) the adjustable speed turbine line shaft drive, (2) the single motor line shaft drive, and (3) the sectional electric drive.

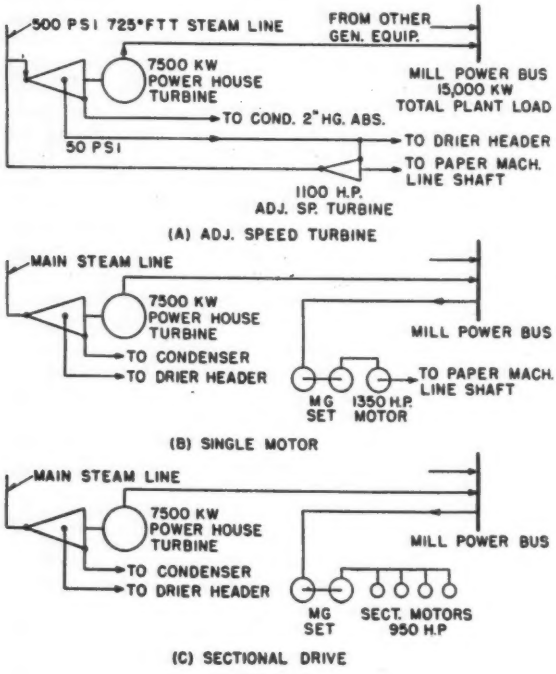

FIG. 4
Typical Layout of Three Types of Paper Machine Drive

The adjustable speed turbine drive consists essentially of a high speed geared turbine of the required capacity to drive the machine, selected to meet the existing steam conditions and ordinarily arranged to exhaust into the paper machine drier steam header. Such a unit may be belted or coupled to the paper machine line shaft. As the operating speed of the machine must be stable and accurately maintained over the required operating range, turbines designed for this service must be provided with governors which are: extremely sensitive to assure a high degree of accuracy, highly responsive, to avoid excessive variations during transient conditions, and effectively damped, to insure stability. To provide flexibility of control the turbine units for this service should be provided with operator's stations arranged for remote control.

The single motor adjustable speed paper machine line shaft drive consists essentially of; a direct current motor, which may be coupled or belted to the paper machine line shaft; a motor generator set for converting from alternating to direct current for supplying power to the line shaft motor; complete control with an operator's control station arranged for convenient location on the machine room floor; and speed regulating equipment designed to provide close speed regulation and stable operation over the speed range. With a drive of this type the generating equipment in the main power house must have sufficient capacity to meet the power requirements of the paper machine in addition to that of the balance of the mill. The main power house units will also be required to supply all of the process steam for paper drying.

The arrangements of equipment are quite different with adjustable speed turbine and with single motor line shaft drive. The turbine drive has the advantage of direct conversion from the energy in the steam to line shaft motive power, thereby reducing the required capacity in power house generating units by the amount of the paper machine requirements at high

speed as well as eliminating the conversion losses in the electrical system of the single motor drive. On the other hand the single motor line shaft drive has the advantage of the somewhat higher operating efficiency of the larger power house turbine unit as compared with the smaller paper machine drive unit and also the advantage of a higher sustained operating efficiency over the operating speed range.

The sectional electric drive consists essentially of: individual direct current motors and reduction gear units mounted on common bedplates and suitable for direct connection to the intake shafts of the various sections of the paper machine; one or more power sets for converting from alternating to direct current and for supplying power to the individual section motors; auxiliary sets for supplying excitation and regulating energy to the control and rotating equipment; complete control for both a.c. and d.c. equipment with operator's control stations for each individual section of the machine as well as the machine as a unit; and speed regulating equipment designed to provide close speed regulation and stable operation of the machine over the operating speed range and to maintain uniform draws between the various sections of the machine. As with the single motor drive the plant power house is required to supply the energy for driving the machine as well as the process steam for paper drying.

The sectional electric drive can not be compared directly in first cost with either the adjustable speed turbine or single motor line shaft drives. This is because the sectional electric drive eliminates all line shafting, belting, cone pulleys, clutches, and gear stands which parts are required with turbine or single motor mechanical drives. From the standpoint of over-all plant heat balance sectional electric drive has an advantage over either turbine or single motor line shaft drive in that line shafting losses are entirely eliminated. Such losses may vary from 10 to 20% depending upon the construction and the adequacy of the design. As with single motor drive the adjustable speed turbine has the advantage of a direct conversion from steam to line shaft motive power, however, this advantage is off set with section electric drive by the higher operating efficiency of the constant speed power house turbine unit as compared with the smaller adjustable speed paper machine unit.

Relative Performance

The relative performance of these three types of paper machine drive will depend upon the actual mill operating conditions, and will vary with steam conditions, the yearly production schedule in terms of the maximum operating speed, the relative size of the power house turbine generator and the paper machine adjustable speed turbine unit, and finally the mechanical efficiency of the line shaft drive. As an example consider the relative performance of the three types of drives under typical plant operating conditions as follows:

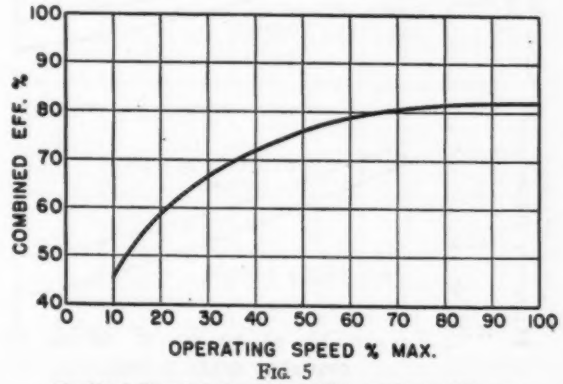

FIG. 5

Combined Electrical Conversion Efficiency Single Motor or Sectional Drive

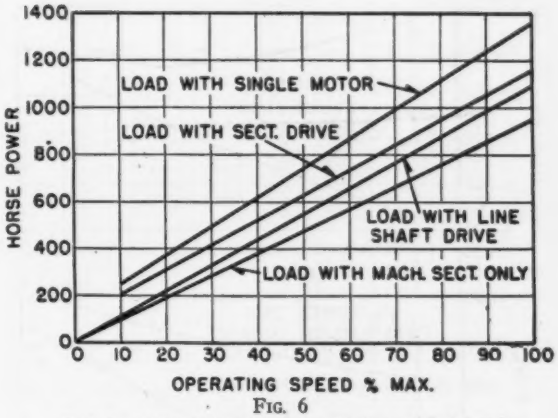

FIG. 6

Variation of Power Requirements with Type of Drive and Operating Speed

(a) Steam conditions: 500 p.s.i. gage, 725° F. total temperature, 2 inches Hg. absolute condenser pressure, and 50 p.s.i. gage process steam pressure for drying.

(b) Paper machine: 240-inch fourdrinier designed for producing a kraft sheet over a speed range of 1350 to 135 f.p.m. having a production rate over the dryers of 500 tons per 24 hours, requiring 100,000 pounds of steam per hour for paper drying and an input to the machine section intake shafts of 950 hp. at the maximum operating speed. For the purpose of the analysis it has been assumed in connection with the machine operation that the driving torque and production rate will remain constant over the operating speed range of the machine.

(c) Power house turbine generators: A plant of 500 ton capacity will require 15,000 kw. and for the purpose of this analysis the relative performance of the three drives is based on a 7,500 kw. capacity condensing bleeder turbine supplying both power to the mill bus and process steam at 50 pounds pressure for paper drying.

(d) A 15% line shaft loss has been assumed for the line shaft mechanical drive.

Figure 4 indicates the layout for the three arrangements of drive. In this figure: (a) represents the layout with adjustable speed turbine, (b) represents the layout with single motor, and (c) represents the layout with sectional electric drive.

Figure 5 indicates the performance of either the single motor or sectional electric drive over the 10 to 1 operating speed range. This curve is based on the over-all efficiency of a 1100 hp. capacity single motor drive or a 950 hp. capacity sectional electric drive and includes the electrical conversion losses in the motors and generating equipment.

Figure 6 is a composite set of curves indicating the paper machine power requirements as they vary with the operating speed range and with the three types of drive.

Figure 7 shows the operating load of the adjustable speed turbine over the operating speed range and the steam flow to the turbine. One of the curves in this set indicates the power which could be developed on the 7500 kw. power house turbine with the same quantity of steam being extracted at the drying pressure.

In Fig. 8, to permit a direct comparison, the power demands of both the single motor and sectional drive on the power house turbine as well as the available power when extracting an equivalent amount of steam as shown in the preceding Fig. 7, are replotted. The excess of available power over the power requirements for either the single or sectional drive permits reducing the steam flow to the condenser of the 7500 kw. power house turbine by an amount as determined

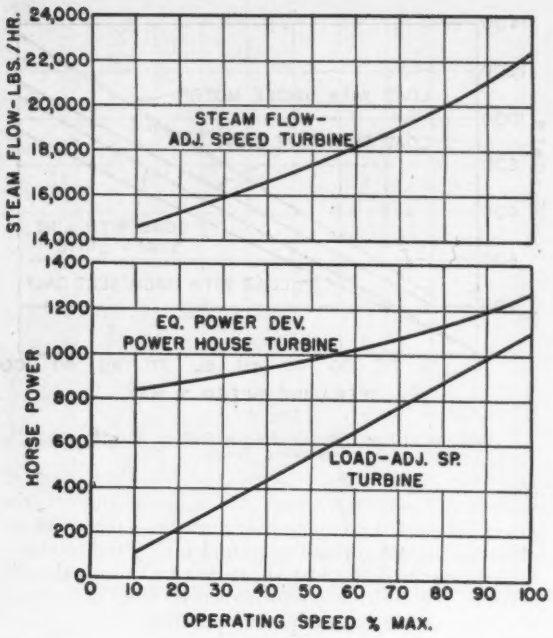

FIG. 7
Performance of Adjustable Speed Turbine and the Equivalent Power Development on Power House Turbine

by the reduction in power requirements and the condensing water rate on the turbine. The reduction in steam flow has been plotted for both the drives over the operating speed range. In addition to the actual reduction in steam flow, the yearly value of the steam on the basis of 7000 hours per year and a steam cost of 40 cents a thousand pounds has also been shown.

In the particular example chosen for this analysis, it will be noted that sectional electric drive shows an improvement in performance over the adjustable speed turbine over the entire operating range whereas the single motor drive only shows an improvement from 85% maximum speed to minimum speed and from 85% maximum to maximum speed the turbine shows an advantage over the single motor drive. This is due to the fact that with sectional electric drive the elimination of line shaft losses and the improved steam economy of the larger constant speed power house turbine unit as compared with the smaller adjustable speed paper machine turbine entirely offset the electrical conversion losses of the sectional drive. With single motor drive although the advantages of improved steam economy are retained, the line shaft losses are not eliminated and therefore this drive only shows an improvement from minimum to 85% of maximum speed. Above this point the electrical conversion losses offset the improvement in steam economy and the turbine drive shows up to advantage.

The adjustable speed turbine is at a disadvantage over the lower portion of the operating speed range because of the critical effect of the operating speed on the turbine efficiency. From Fig. 8 it will be observed that sectional electric drive shows a reduction in steam flow when compared with the adjustable speed turbine drive of 4700 pounds per hour at 1/10 maximum speed to 800 pounds per hour at maximum speed. Single motor drive shows a reduction of 4300 pounds per hour at 1/10 maximum speed, zero at 85% maximum speed and at maximum speed the turbine shows a reduction in steam flow of 500 pounds per hour.

In this analysis the relative performance has been based on assumed steam conditions. It is of interest to note that the possibilities in steam flow reduction increase with a reduction in either initial steam pressure or temperature or with an increase in the absolute pressure maintained in the condenser. On the other hand the performance is not materially affected with a variation in the process steam pressure. It should be noted, however, although the pressure of the process steam does not materially effect the relative performance of the three types of drive, any change in this pressure has a very marked effect on drying cost. In the particular example under consideration an increase in drying pressure of 10 pounds although maintaining drying capacity with approximately 10% less driers, results in a yearly increase in drying cost of $7000. It should also be noted that as the relative size of the power house turbine unit decreases with respect to the paper machine unit, the performance is less favorable to either sectional or single motor drive.

The foregoing analysis has been based on an assumed set of operating conditions and represents the normal performance which might be expected from commercial units operating under these conditions. Although the operating requirements as set forth are quite typical of many mills the example is only intended to illustrate the method and the importance of making such an analysis. Each individual case must be studied under the actual prevailing conditions and the operating requirements and costs definitely ascertained. Performance should be based on equipment guarantees, and apparatus costs at prevailing markets. Frequently, considerations other than the relative operating economies serve to justify capital expenditures, however, when the paper machine drive is involved, an analysis of the relative operating economies of the three types of drive is essential in determining the proper procedure.

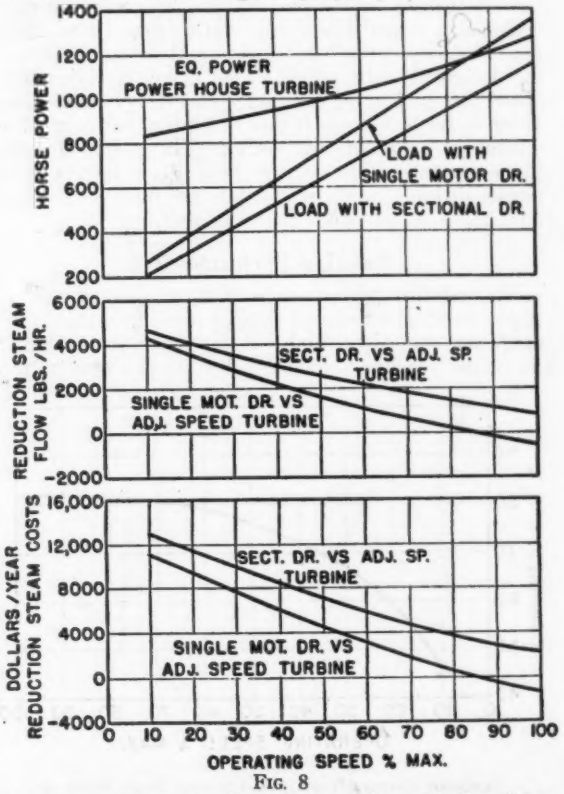

FIG. 8
Comparative Performance Three Types of Paper Machine Drives